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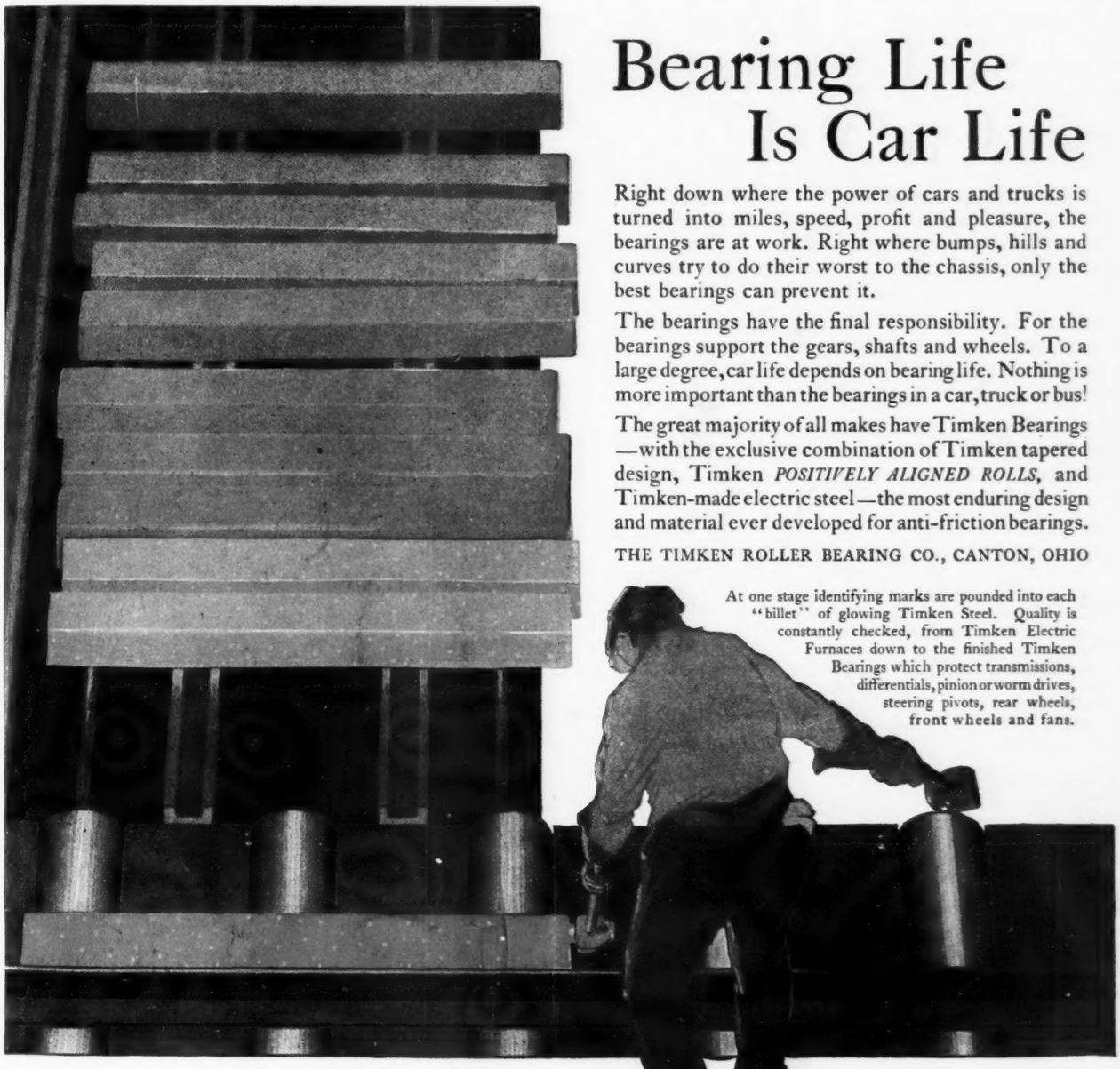

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The bearings have the final responsibility. For the bearings support the gears, shafts and wheels. To a large degree, car life depends on bearing life. Nothing is more important than the bearings in a car, truck or bus!

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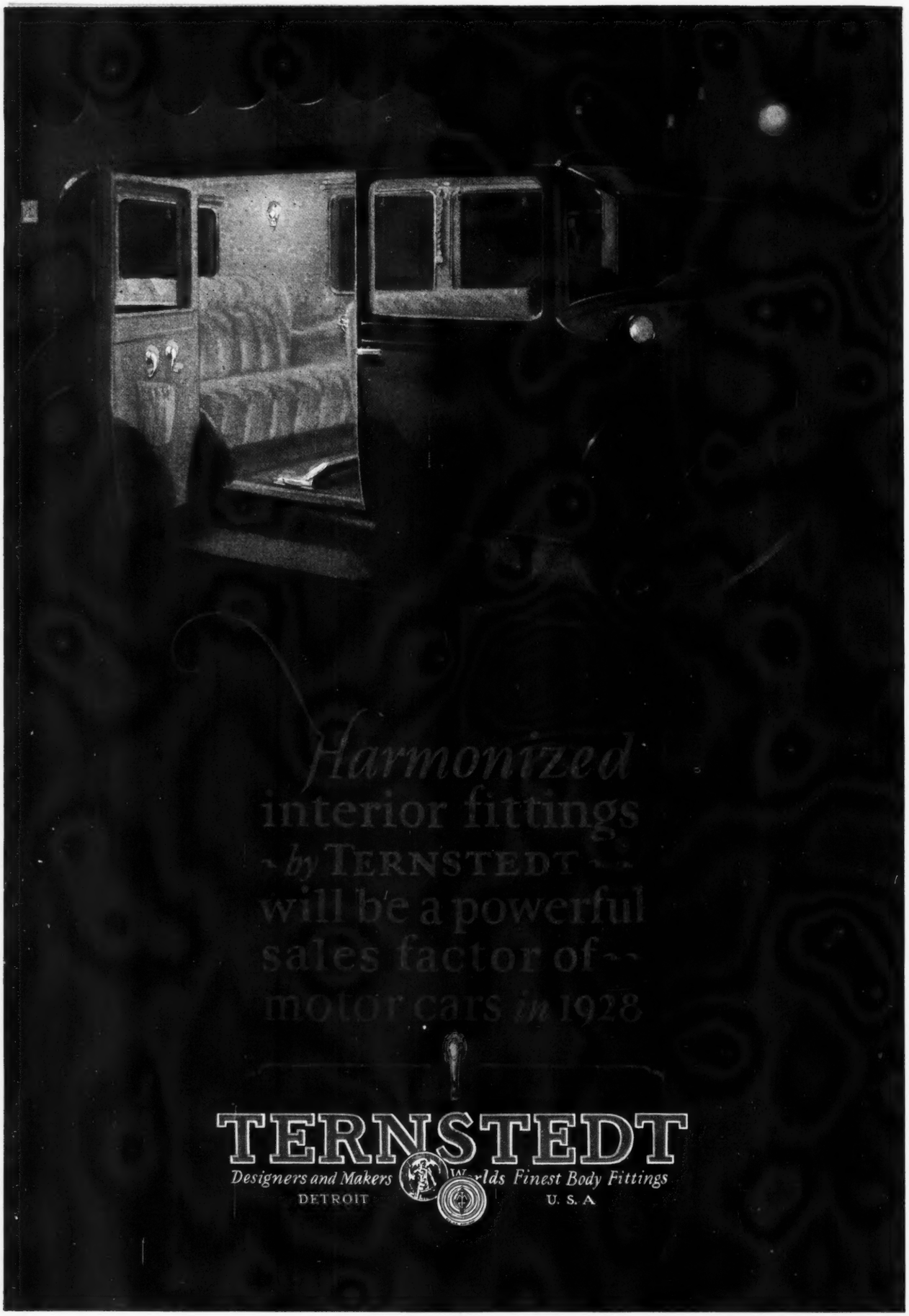

Harmonized
interior fittings
- by TERNSTEDT -
will be a powerful
sales factor of
motor cars in 1928
TERNSTEDT
Designers and Makers of the Worlds Finest Body Fittings
DETROIT
U. S. A.

AUTOMOTIVE INDUSTRIES
VOLUME 57 *Philadelphia, Saturday, December 10, 1927* NUMBER 24

Interest Created *by Ford* Should Benefit Whole Industry

Announcement of new car will release heavy volume of buying in all price classes. New standards of value set by Model A mechanical design.

By John C. Gourlie and P. M. Heldt

NOW that the new Ford has been launched upon the market, with a fanfare of publicity and backed by what appears to be the most lavish advertising campaign ever attempted, the automobile industry as a whole is presented with a question and an opportunity.

The question is to what extent the astonishingly low price of the Model A, together with its other attractive features, will influence the sales of cars in higher price classes.

The opportunity, as we see it, is for all manufacturers to participate in what amounts to the release of an unprecedented volume of buying demand for automobiles. Final figures for 1927 will probably show that the automotive industry has lost ground to other industries engaged in the production of durable goods for consumers. Next year, from all indications, should mark a reversal of the trend and there is no reason why a large majority of automobile manufacturers should not be the gainers. The quickening of public interest in automobiles will not be restricted to the Ford product.

Price considerations can easily be overemphasized, but there is no denying that there was a general expectation that Model A would be marked up over the Model T more than it has been. The average advance is only $16, and on what is probably the most important model, the Tudor sedan, there is no advance. Obviously, on a price basis, Ford is still favorably situated with respect to cars in the classes immediately above.

To some degree, therefore, Ford has done what many doubted he would be able to do—he has brought out a really modern car, involving a complete rebuilding of his production organization, at a price scarcely exceeding that of the Model T.

It will be questioned whether the new prices are not too low. Certainly they would be for the conventional type of industrial organization, publicly owned and under a moral obligation to pay a more or less regular return to stockholders. Certainly Henry Ford must be counting on a long period of production at a high rate, because only very large quantity output could conceivably support such a price.

There seems little reason to doubt, however, that Mr. Ford believes the car can be produced and sold at approximately the initial price. He must know that it would be the worst of bad business to raise prices later, after the first rush of buying has subsided. He is in a seller's market now

Millions Saw New Ford Car First Two Days

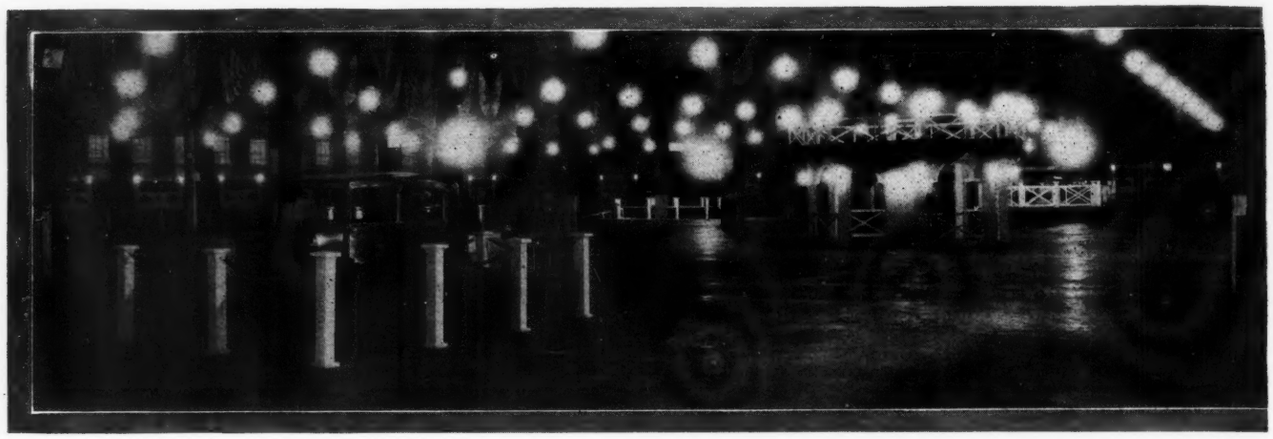
TEN MILLION people in the United States saw the new Ford car the first two days it was on display according to an estimate by the Ford Motor Co.

In Detroit the show closed Monday night. At a number of other points the initial displays closed Saturday and the showings in dealers' establishments were begun.

Thousands of orders, it is said, have been placed with dealers for cars—just how many thousands will not be known for several days as the total is still mounting.

Three districts, Detroit, Kansas City and New York, reported attendances at the special showrooms and dealers' establishments on the first day of the showing in excess of 650,000 each.

Reports from various areas indicate that Ford dealers are exercising their own ideas in regard to time sales and trade-in policies, transacting business on the terms which seem best suited to their individual requirements in each case.



"Hire a hall" was Ford's slogan in introducing the Model A.

and could have charged more for his product if he had so desired or thought necessary.

What Mr. Ford has done, of course, is to throw the company's immense financial resources into development of the new car without apparently feeling any need to absorb the development cost in the price of the car. He is said to have observed recently that he expected to spend $200,000,000 in turning over to the Model A, but parts sales have evidently been so satisfactory that not so great a reduction in the assets of the company has been required.

In any event the cost was staggering. In a single model change the reserve of financial power accumulated in years of successful concentration on an essentially unchanged car was, to an important extent, wiped out. There is here no implication that the powerful financial position of the Ford company has been seriously impaired. Although working capital was reduced by the change, the company had far more than it needed and there is unquestionably an abundance left for the conduct of the business.

But Ford's policy in this respect is sharply at variance with the usual business practice. Development expense has to come out of current earnings or be amortized over a comparatively brief period. If we assume two year's production of the Model A at an annual rate of 1,250,000 cars—a figure that many would consider too high—amortization of the development expense would mean a charge against each car produced of nearly $70. It appears fairly obvious that there is no such provision made in the price of the new car.

Assuming the truth of the latter contention, what is Mr. Ford's thought of the future? Does he expect to produce 15,000,000 of the present line, as he did of the former, and thus build up another huge reserve for expenditure in the next changeover? Or does he believe that after the present revamping of his factories he will be in position to make other changes at comparatively minor cost in equipment and loss of current sales?

Presumably, having modernized the car, future changes will be more in the matter of detail and, so far as factory equipment is concerned, much less costly. But he has still to prove his ability to introduce innovations as quickly and as frequently as the automobile market now apparently demands.

As has frequently been pointed out in these pages, the ultimate continued success of the Ford organization rests in its ability to make changes as often as the public taste requires, or technical advancement renders imperative, without that loss of time which means losing sales, and without adding so much to the price of the car that it loses its competitive advantage in this respect.

Beyond a doubt the need of further changes will be increased rather than lessened by the introduction of the Model A. The superlative ability of the engineering departments of the other low-priced car producers will be given the greatest possible incentive to further improvement. Inventive genius will be coupled with production ingenuity to enhance quality without adding to price. A stimulus is now present that was lacking before.

It is by improvement of the cars and by better merchandising rather than by reduction of prices that the industry can best benefit by the outburst of public interest in automobiles. Even the thought of competition strictly on a price basis would be folly. It could only be done by ignoring the need for constant improvement to maintain volume. It could only be done, in other words, by abandoning a tried and true production and sales policy for a highly dubious and unproved policy.

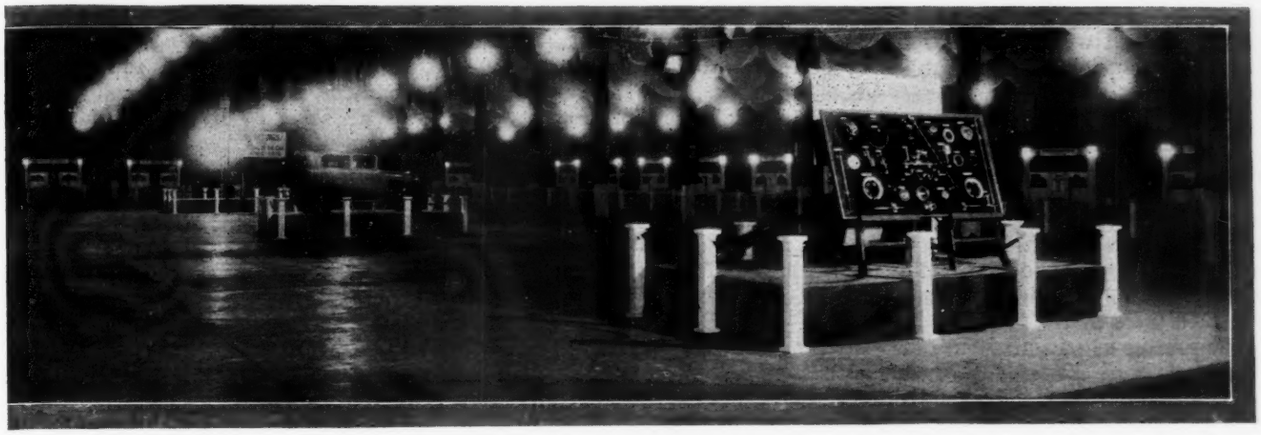
Furthermore, as already implied, the Ford company, because it is under no obligation to pay dividends, can do things, for a time at least, that a publicly-owned company cannot consider for a moment. The industry has everything to gain by adhering to its established policies and permitting economic forces to reestablish an equilibrium that may be temporaily disturbed.

On the whole, however, there is no reason to believe that in 1928, when the influence of the new Ford will be most strongly felt, there will not be an eminently satisfactory market for producers in every class. This

Old and New Ford Prices Together With Those of Other Makes Having a 4-Door Sedan Listing Below $900

	Roadster	Touring	2-Door Sedan	4-Door Sedan	Coupe
Ford Model "T"	$350	$380	$495	$545	$485
Ford Model "A"	385	395	495	570	495
Chevrolet	525	525	595	695	625
Star	550	550	675	765	650
Whippet 4	695*	625	625	725	625
Whippet 6	825*	765	795	875	795
Dodge 4	795	795	...	875	855
Essex	700	...	735	835	735
Chrysler "52"	725*	750	735	795	725
Pontiac	745*	...	745	845	745

*2-4 Passenger



This picture shows how the event was staged in Philadelphia

can be demonstrated by a little study of the 1927 production and sales situation.

Output of cars and trucks this year will probably be just about 3,500,000, of which about 430,000 will represent Ford's share and 3,070,000 all others'. This is a major decline from the 1926 total for all companies, including Ford, of 4,428,286. But at the same time the companies exclusive of Ford will exceed their 1926 output by about 8 per cent.

If Ford turns out a million and a half units next year the rest of the industry could operate on about the basis of this year and the output for all would be 4,500,000—not by any means an unlikely figure. On the basis of the estimate of John J. Raskob of General Motors Corp. —5,000,000 units for the industry—Ford could approach his former record of around 2,000,000 cars and trucks without rendering the remainder of the companies any less favorably situated than this year.

But a reasonable basis for calculation would be that Ford would not greatly exceed one-third of the total for the industry, which would mean a good production year for all companies if the total did not fall much below 4,500,000 units.

The production situation affords another side-light on the question of prices. In recent years a drop in production of the magnitude attained this year has brought higher prices for motor cars. This happened in 1921 and 1924, both years of falling production and rising prices. Prices might have had to be advanced this year if Ford had continued in the market and output nevertheless shown a considerable decline from the 1925 level. As the companies exclusive of Ford cannot, as a group, reasonably expect to better by a very great margin this year's showing, increased production cannot be relied upon to justify price cuts.

Without discounting the ability of the new Ford car to capture the public fancy, there are still several reasons to believe that it will not make the complete runaway with the market that was achieved in some years in the past. As an instance in point, Ford's gain in the number of cars now in operation as compared with his heyday three years ago is only about 12 per cent compared with Chevrolet's 100 per cent. Three years ago Ford registrations were about 7,000,000 while today there are perhaps not more than 7,500,000. In contrast Chevrolet, which had 1,000,000 cars in the field three years ago now has 2,000,000.

As car owners are potential buyers mainly of new cars of the same make, Ford clearly has a smaller competitive advantage in this respect than in former years. The altered position is emphasized when the low value of the used Fords is considered. A radical change in models always affects used car values in the line adversely and influences the willingness of buyers to make trades for new cars.

A quite possible influence on Ford sales next year is the gap between the announcement and showing of the new car and the beginning of actual deliveries to customers. There will be time for the initial enthusiasm to cool off and more serious consideration will be given to other makes. Based on the official forecast that production of the new car will be 1000 a day in January, 2000 a day in February, and so on until the peak is reached, it appears likely that for many months Ford dealers will be faced with the inability to make prompt deliveries, which may also prove a disadvantage. This factor, however, would be much more serious if the introduction had come at a time of year when customers are most desirous of immediate delivery.

In all other ways, furthermore, the Ford dealers should be in excellent condition. They are in position to refuse trades for a long period ahead, and while this may ultimately result in loss of sales to other lines, it will mean profits for the dealers which will go far toward compensating for the lean months recently experienced.

Edsel Ford's statement in *Automotive Industries* last week that Ford dealers now number 8500 would tend to indicate that the falling out is not as serious as had been thought in some quarters. It is estimated that last year there were 9800 Ford dealers. Those who have dropped out are in the main, perhaps, the weaker ones, so that the organization as a whole has suffered very little.

Mr. Ford also declared that a large

Power and Wheelbase Specifications of American 4-Cylinder Cars

	Wheelbase	Piston Displacement	Brake Horsepower	Engine Speed
Ford Model "T"	100 in.	177 cu. in.	20	1600 r.p.m.
Ford Model "A"	103.5	200.5	40	2200
Chevrolet	103	171	26	2000
Chrysler "52"	106	170	38	2800
Dodge	108	212	35	2000
Whippet	100¼	134	30	2800
Star	103	152	30	2200

number of applications for new franchises are on file, a situation that would naturally be expected. Whether renewed expansion of the number of dealers will be started cannot be foretold.

If the Ford company follows the overwhelming desire of the dealers it will make no additions to the present organization. These dealers are in large proportion veterans and they are probably better business men for having tided over the bad period. It has enabled them to devote more attention to service and develop the possibilities of profit in that end of the business. They ought to be able to make the most of the opportunity presented them by the Model A.

As a matter of fact, there are evidences that the Ford company is more disposed to consult its dealers on sales policies than has been the rule. Dealers report that the factory representatives who have visited them recently are seeking advice rather than handing down orders from on high.

Bull Market for Fords

All in all, it's a bull market for Fords, as it seems reasonable to believe that in placing on the market the Model A, Henry Ford has set up new standards of value in the automotive industry, just as he did when, at the New York automobile show in 1907, he announced that he would market a four-cylinder car at $500 or less, and in 1921, when he cut the price of his farm tractor exactly in half.

Although the engine power is doubled (as compared with the superseded Model T), and the car is more roomy, well up-to-date in mechanical features, more liberally equipped and far more attractive in appearance, it is, as previously shown, to be sold at only an insignificant increase over the latest figures for the Model T.

The new car is not in any sense a redesign of the Model T, for of the many characteristic features of the latter it retains only one—the cross springs. These were never very popular with the "style-conscious" section of the Ford clientele, but whatever objections there may have been to them in the past seem to have been overcome in the new design. In the new car the springs are no longer plainly visible, so they do not affect the appearance as a whole, and better riding qualities have been obtained by the use of a greater number of thinner leaves and the provision of shock absorbers.

With an engine developing 40 hp. on the brake the new Ford is the most powerful car in the four-cylinder, low-priced class by a good margin. The acceleration figures given out (5 to 25 m.p.h. in 8½ seconds) are on a par with those for modern six and eight-cylinder cars.

That it should have been possible to double the horsepower without materially increasing the dimensions of the engine may be a cause for surprise, but is explained by the fact that the Model T was a low speed, low compression engine. The gain in power is the result of three increases—an increase of 13.5 per cent in displacement, an increase of 37.5 per cent in speed of revolution, and an increase of 28 per cent in the energy developed per unit of piston sweep, which is due no doubt to both higher volumetric efficiency and a higher compression ratio.

The loss of popularity of the Model T undoubtedly was due chiefly to deficiencies with respect to riding comfort, appeal to the eye, and ease of maintenance, and all of these points seem to have received very careful attention in the design of the new machine. The old pistons were rather heavy, and as a result there was unpleasant vibration at speeds above 35 m.p.h., as well as when the engine was operated in low gear and was racing in consequence. By the use of aluminum alloy pistons the weights of these reciprocating parts have been nearly halved, in spite of the increases in bore and stroke, the new pistons weighing slightly less than 18 oz. each, as compared with about 30 oz. for the old cast-iron ones. Of course, every four-cylinder car with an engine of conventional design has its critical speed, at which there will be perceptible vibration, but with the pistons so much reduced in weight the amplitude of the vibrations should be greatly lessened.

The use of circular disks for the short crank arms has been rather puzzling to some observers. These disks, since they are eccentric to the crankshaft axis, have no direct balancing effect. Of course, since they are completely machined they are likely to be more nearly alike as regards their unbalanced moments than unfinished drop-forged arms would be, but the most likely reasons for their use is that they permit of slightly reducing the over-all length of the engine.

Connecting rods with a section in the form of a cross, while not new, represent a departure from conventional practice.

As compared with European high-speed four-cylinder engines the crankshaft of the new Ford seems to be of rather small diameter. However, there is no reason to doubt that it is adequate for the loads upon it, as the Ford engineering organization can be depended upon to have made sure of this point, and the explanation undoubtedly is to be found in the light pistons.

As regards engine accessories, the "sylvan simplicity" of the Model T with respect to its cooling and lubricating systems has been sacrified, both systems now including a pump, the doubling of engine power without material increase in size naturally making far greater demands upon both systems. On the other hand, the ignition system has been greatly simplified, and this is probably the only example where the modernization and improvement of an important component has been accompanied by a decrease in cost, for it stands to reason that a distributor unit and a single plain coil cost considerably less to manufacture than a magneto, a timer and four vibrator coils.

Hood Space Cleaned Up

The cleaning up of the space under the hood is one of the most attractive features of the new car to the mechanical mind. Instead of the maze of wires from the dash to spark plugs, timer and magneto there are only two wires between the engine and the dash, the high tension wire from the coil to the distributor and the low tension wire to the lock switch, inclosed in metal conduit. Fuel and mechancial connections are equally simple and orderly in arrangement.

Little comment is called for in connection with the transmission, which is of the now practically standardized type, but deserving of mention is the fact that all of its bearings with the exception of those in the reverse idler are of the ball or roller type. Such liberality in the use of anti-friction bearings is uncommon in the low-price field and places the Ford on a par with transmissions in cars of a much higher price class. A large roller bearing is used also at the forward end of the propeller shaft housing, at a point where, with a plain bearing, wear and depreciation is quite rapid.

The rear axle is now of the three-quarter-floating instead of the semi-floating type. The result is that any shocks sustained by the road wheels in a direction perpendicular to the axles are transmitted directly to the axle housing and do not affect the axle shafts, hence axle shaft breakages should be greatly reduced.

An entirely new feature is the four-wheel braking system. The brake drums are built into the steel-spoked

wheels and the braking effort is mechanically transmitted by what appears to be a neat and simple mechanism. The adoption of four-wheel brakes is a logical consequence of the great increase in power.

One of the other units of the Model T which has disappeared is the steering gear, which was completely reversible and therefore transmitted all road shocks directly to the driver's hands. The new steering gear is of conventional design, thus reducing the strain on the driver. An improvement of no mean importance is the provision of taper roller bearings on the knuckle, a point at which, with plain bearings of rather small dimensions, wear and rattle develop rather quickly.

Another innovation that will no doubt have considerable influence on purchasers is the fact that all models can now be had in four different colors.

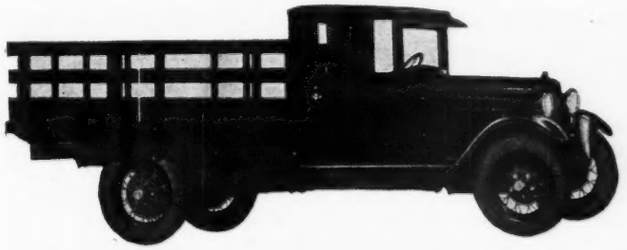
Ford Offers Auxiliary Transmission for Truck

TRUCK models in the new Ford line are rated at 1½ tons with single rear wheels and 2½ tons with dual rear wheels. Four-wheel brakes, worm-drive rear axles, torque tube drive, cantilever rear springs, and welded steel-spoke wheels are used on both models, which are practically identical except for rear wheel equipment. The powerplant is the same as that embodied in the new passenger cars, consisting of a four-cylinder 3⅞ by 4¼ in. engine with battery-distributor ignition and oil and water pumps, multiple-disk clutch and three-speed sliding gear transmission. An additional two-speed auxiliary transmission is offered at extra cost. Front axle, front wheel brakes and steering gear are substantially the same as the passenger car units.

Wheelbase is 131½ in., compared with 124 in. on the former truck. The rear axle is similar to the unit formerly used and the necessary extension of the power line is accomplished by use of an inclosed intermediate propeller shaft. At the rear of the transmission a tube with a ball end similar to that on the front of the torque tube is mounted within the ball cap and this tube and the propeller shaft extend to a frame cross-member where the universal joint, ball and cap assembly are duplicated. The auxiliary transmission when supplied is placed back of the regular unit and in place of the front part of the intermediate propeller shaft.

The 17-leaf rear springs are located outside the frame rails and are shackled to the frame at the front end and pass below the trunnion mounting on the side of the frame. Connection with the rear axle housing is made by a split member which encircles the housing. The main leaf of the spring is practically level and has little if any camber.

The rear axle is of the three-quarter floating type with rear wheel loads taken by roller bearings on the outside of the housing. The assembly embodies two axle housing halves bolted together and an overmounted worm with double external adjustments. Standard gear ratio is 5 to 1. Two radius rods are employed on the torque tube and the axle end of each rod is used to support the inner end of the brake shaft.



The Ford Model A truck embodies the same basic improvements as the new passenger car chassis. It has cantilever springs on the rear

Two rear wheel brake drums, which are 14 in. in diameter, inclose internal brakes of the rigid-shoe type. Two shoes are used in each brake and they are divided on a horizontal line with the operating cam at the front and the adjustable anchorage at the rear.

The frame has an overall length of 171 5/16 in. and the depth is 6 in. with flange width of 2¾ in. The bottom of the side rail tapers upward from the trunnion mounting for the rear springs to the rear end. Five heavy channel cross-members are used, the rear member being offset downward and fitted with a bracket for carrying the spare wheel, or wheels, below the body. The next member forward is of U-section with wide flanges and is arched to provide clearance for the axle housing. The third carries the forward end of the torque tube and the next carries the front propeller shaft, or the bearing between the two transmissions if the dual unit is used. The front cross-member mounts the engine front support, the radiator and the transverse front spring. In addition the rear engine supports virtually form an additional cross-member.

Truck wheels on the model recently shown differ from those used on the passenger cars in that a quick-detachable locking ring is employed. Tires are straight side cords 30 by 5 in. on the front and 32 by 6 in. on the rear.

An inclosed cab and express, stake and platform bodies are available. Cabs are all steel and are finished in imitation leather and the doors, which are equipped with crank window regulators, are similar to those used on the passenger cars. The gearshift lever is in the center and the hand brake lever on the left. The light control switch is placed above the steering wheel and the spark and throttle levers are below it but quadrants are not provided. A carburetor control rod is beneath and forward of the cowl on the right and the gasoline shut-off valve may be reached from the driving compartment.

The express body is all steel except the floor and sills, which are of seasoned wood. This body is 7 ft. 2 in. long and 4 ft. wide while the stake body measures 8 ft. 1½ in. inside length and 5 ft. 8 in. width, the racks extending 26 in. above the floor.

On a truck exhibited in Philadelphia, said to be the first shown, the radiator shell was finished in black enamel, as were the headlamps except the rims, which were nickel-plated.

Distance from the back of the cab to the rear of the frame is approximately 81½ in. and from back of cab to center of rear axle about 52 in. The height of the frame is approximately 31 in. at the rear and 27½ in. at the rear of the cab. The frame tapers outward from the rear, being about 33½ in. wide at the cab and 40½ in. at the rear end.

Financial History *of* Nash

Charles W. Nash

Company has record of unbroken prosperity since organization in 1916. Nearly 30 millions in cash dividends have been paid on original investment of $5,050,000.

THE financial history of Nash Motors Co. is much more than a matter of cold facts and figures, for back of the astounding advance in the earning power of the company there has been always in evidence a human element and a steady purpose. Conservatism has been balanced by a courageous acceptance of opportunities. Guided and inspired by the genius of Charles W. Nash, the company has shown an almost flawless judgment of market and merchandising trends, avoiding thereby the mistakes that have so badly hampered the progress of some other enterprises in the same field.

It is perhaps impressive enough to report that Nash has paid nearly $30,000,000 in cash dividends on an original investment of $5,050,000. But even more interesting is the manner in which common stockholders have been brought to an impressively dominating position with respect to the assets and earnings of the corporation. The multiplication of annual earnings has at no time involved undue risk to the stockholders. On the contrary, the conservative policies pursued have built up an impregnable financial condition. The drastic writing down of property and investments during the decade of operations hints at assets which possibly are concealed by the balance sheet.

Despite the generous distribution to stockholders in the last eight years, Nash has been able to retain more than $50,000,000 out of earnings for reinvestment and the retirement of preferred stock. About $16,000,000 has been used for retirement of preferred and nearly $25,000,000 has been added to working capital. More than $12,000,000 has remained for physical property investment. This item, however, grew only $5,500,000 in the period 1919-1926 while miscellaneous investments declined about $4,000,000. Thus there is a fair assumption that plant and property is considerably undervalued.

At the end of 1926 plant and property stood at $8,624,638 and miscellaneous investments, including the corporation's interest in the Seaman Body Corp., at $954,962, or a total of $9,579,600 for the two items. Per car produced in that year, therefore, the fixed investment employed was only about $70. Total capital employed per car was $410 and net tangible assets were $310 per car produced.

The stock changes since the organization of the company have been largely in the direction of strengthening the position of the holders of common shares. There were issued originally, in 1916, 50,000 shares of preferred at par ($100) and 50,000 shares of common at $1 a share in payment for the entire assets, business and capital stock of the Thomas B. Jeffrey Co.

There were no changes until 1919 when 2000 shares of preferred were purchased and retired and 2000 shares of common sold to employees at $100 a share. In 1920 3000 shares of preferred were purchased and retired and 2600 shares of common sold to employees at $100 per share. In both 1921 and 1922, 5000 shares of preferred were purchased and retired, bringing the shares issued down to 35,000. These were retired Feb. 1, 1923, at 110 and accrued interest.

Before the latter action was taken, however, the company made one of the most notable stock distributions in corporate history. On Dec. 28, 1922, there were issued to holders of the 54,600 shares of common stock, as a stock dividend, 163,800 shares (par $100) of new preferred "A" and 218,400 shares of additional common. Thus the ratio was three shares of preferred "A" and

TABLE 1

Growth in Net Worth and in Net Earnings on Net Worth

Year	Net Worth	Net Earnings on Net Worth
1920	$20,816,177	34 %
1921	21,114,848	10.6
1922	27,445,367	27.6
1923	29,678,687	31
1924	34,790,358	26.8
1925	39,242,647	41.5
1926	43,283,521	56

Motors *is* Impressive

[*By John C. Gourlie*]

four shares of common for each share of common stock held.

On Feb. 1, 1926, the entire outstanding preferred was called for redemption at $105 per share and accrued dividends. The common stock was then the only class outstanding, and the number of shares was soon increased to 2,730,000 (no par), as the result of a 900 per cent stock dividend.

It will be seen that a holder of a share of the original common stock, which was regarded as a bonus on the preferred, would now have 50 shares salable in the market for about $4,750. In addition he would have had over $500 in dividends and $315 in preferred issued as a dividend and later retired for cash.

This outline also shows that, except for $460,000 in common stock sold to employees, the company has financed its expansion entirely through earnings.

The growth in net worth and in net earnings on net worth, after all charges, including depreciation and federal taxes, has been notable in recent years, and particularly so in 1925 and 1926. These comparisons are shown in Table 1.

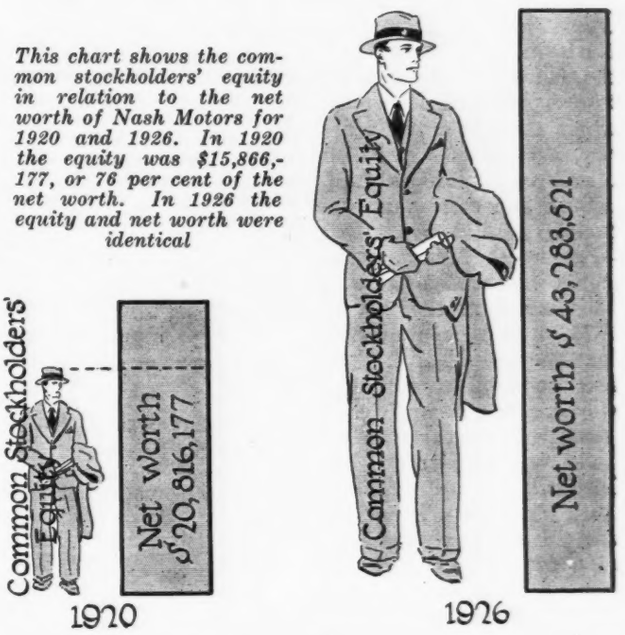
There is available for purposes of comparison a study issued in 1924 by the National Automobile Chamber of Commerce. For all car and truck manufacturers that year the net profits on net worth were 15 per cent, against 26.8 for Nash.

Excluding from net worth the portion applicable to the preferred stocks in years previous to 1926, a figure for the common stockholders' investment is reached that shows even more striking gains. This figure rose from $15,866,177 in 1920 to $30,802,327 in 1925 and $43,283,521 in 1926, a gain in seven years of more than 180 per cent.

The average income available for the common stock in 10 years including 1926, was $2.72 a share on the number now outstanding. In the nine months ended Aug. 31, 1927, net earnings on the common were $5.78 a share, compared with $5.42 in the corresponding period a year ago. Another big year is therefore assured, even allowing for moderate curtailment in the final quarter of the fiscal year.

Perhaps the clearest indication of the superb judgment and foresight of the management is the way in which profits, and particularly profits per unit, have been maintained in years of depression for the industry. In 1921, for instance, production was only half the total of 1920, yet nearly 2¼ millions were earned and net income per car was $108, against a figure of $172 for 1920 and a seven-year average of $161. Again in 1924 production failed to reach the level of the preceding year, yet profit per unit and total net earnings gained slightly.

This chart shows the common stockholders' equity in relation to the net worth of Nash Motors for 1920 and 1926. In 1920 the equity was $15,866,177, or 76 per cent of the net worth. In 1926 the equity and net worth were identical



These results were obtained because the company had kept down overhead—a particular hobby of Mr. Nash's—and because the recession was anticipated and did not find the company overloaded with inventories and with ambitious plans of plant expansion under way. The company has generally followed the idea of making the most of its existing facilities rather than adding new buildings when the opportunity for speeding up production was presented. It has also, on several occasions, acquired plant and property at low prices from companies under liquidation.

An outstanding example of the typical Nash accounting conservatism is the failure to assign any balance sheet value to goodwill, trade-marks, patents, etc. Thus the assets are all tangible and due to the low valuation of plant and property are mainly liquid. Current assets, which stood at $22,627,923 in 1920, rose to $42,530,745 in 1925 and $46,747,050 at the end of the 1926 fiscal year. How current assets have gained in proportion to total capital employed may be seen in the figures in Table 2.

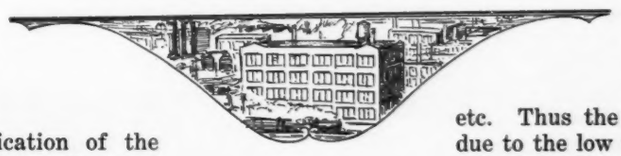
For the entire industry in 1924, gross working capital was 49.3 per cent of total capital employed, against 78

TABLE 2

Gain of Total Assets in Proportion to Total Capital Invested

Year	Current assets	Proportion of Plant, Property, etc.	All other assets*
1920	77%	18%	5%
1921	73	19	8
1922	75	15	10
1923	75	14	11
1924	78	11	11
1925	83	15	2
1926	83	15	2

** Investment and prepaid expenses.*



per cent for Nash. Another good showing is made in the proportion of net worth, or stockholders' equity, to total capital employed. In 1926 net worth was 80 per cent of total capital employed and the remaining 20 per cent, representing borrowed capital, was entirely current liabilities. Naturally, if plant were not valued so low, and if good-will were capitalized, net worth would have a much higher proportion. As might be expected from these considerations, Nash in 1924 was below the industry with respect to proportion of net worth, which stood then at 76 per cent against 88.3 per cent for all companies combined.

Cash and marketable securities have always bulked large in the Nash statements. These items totaled $35,692,838 at the end of 1926, or 78 per cent of total current assets and 65 per cent of total capital employed. Cash and cash items were nearly three times total current liabilities.

On the other hand, inventories have always been kept low, and at the end of 1926 were under the level of the corresponding date of 1925, despite a large expansion in volume. At the more recent date, inventories were only 14.5 per cent of total current assets. If the company regularly published sales figures, some extremely interesting facts regarding inventory turnover could doubtless be brought out.

As it happens, however, the Nash statement for 1924 gave sales as "over $57,000,000." Using this as a basis, inventory was turned over 13.5 times in the year, against 6.3 for the industry. Turnover of total capital employed was 1.25 times in the year, against 1.23 for the industry. Net profit on sales was 16.3 per cent, against 9.6 per cent for the industry.

The bare outline given of the financial history of the company and its current position is enough to show that it has been one of the conspicuous industrial successes of the century. Dividend disbursements have been generous and it is therefore all the more to the credit of the company that it has never had to pass a dividend. Even in 1921, a disastrous year for the industry, Nash Motors earned more than twice the $16 a share then being paid on the common.

A reserve of strength and working capital has been accumulated in recent years that should further prepare the company for any emergencies. With additions made to plant capacity in recent years, including construction begun earlier this year, the facilities for a large and profitable output are available. The stock is now on a regular basis of $4 annually. In two recent quarters, however, extras of 50 cents have been declared, suggesting a purpose on the part of the directors to pay more than the regular dividend annually as conditions warrant. In fact, recent stock-market activity, which has carried the issue to new high levels, is based on a belief that the directors will establish a regular $6 annual dividend at the January meeting. The present $4 rate was established early this year.

Current estimates of earnings for the fiscal year ended Nov. 30 indicate a new record of about $25,000,000 after all charges and taxes, equal to $9 a share on the stock, of which only $5 has been paid in dividends. Thus there have been important new additions to surplus and the foundation has been laid for dividend increases. It is believed generally that the directors favor further cash disbursements rather than another stock dividend, so long as the stock does not rise to an unwieldy high price.

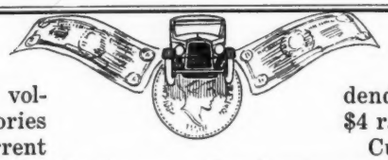
On the basis of its splendid record in the past and the favorable prospects for the future, the stock at recent market levels of around 95 does not seem over-valued.

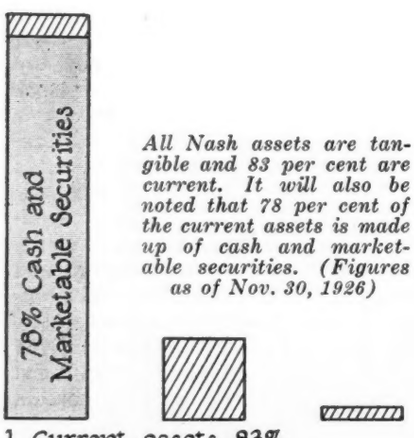
TABLE 3

Net Profit Per Car—1920-1926

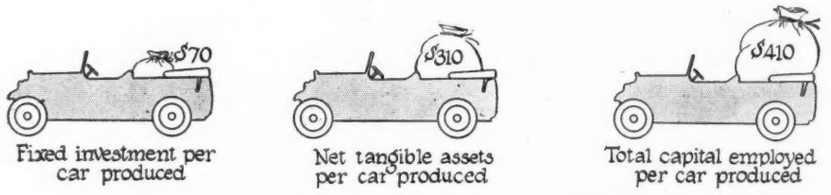
Year	Output	Net Income After Depreciation and Taxes (Years Ended Nov. 30)	Approximate Profit Per Car
1920	40,820	$7,007,471.00	$172.00
1921	20,737	2,226,078.00	108.00
1922	40,350	7,613,246.00	189.00
1923	56,569	9,780,032.00	163.00
1924	53,135	9,280,541.00	175.00
1925	93,397	16,256,216.00	174.00
1926	137,376	23,346,306.00	150.00

Average net income per car ..$161.00

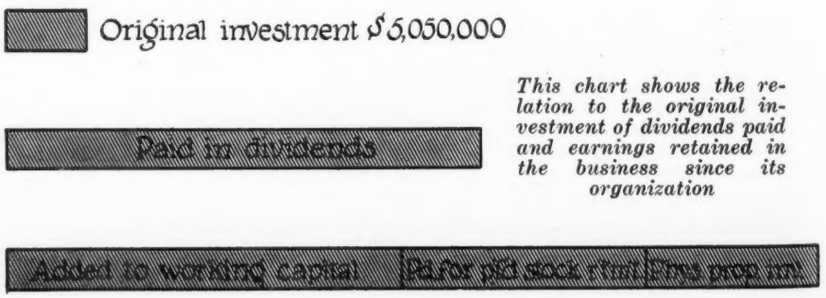




All Nash assets are tangible and 83 per cent are current. It will also be noted that 78 per cent of the current assets is made up of cash and marketable securities. (Figures as of Nov. 30, 1926)



Frequent turnover of investment has always been a characteristic of the Nash organization. These figures are based on the 1926 report



This chart shows the relation to the original investment of dividends paid and earnings retained in the business since its organization

Average Registration Fee *for* Car *in* England *is* $50

American-made vehicles at disadvantage on account of high horsepower rating. Much interesting automotive data found in second edition of S. M. M. & T. book

SOME very interesting information about The Motor Industry of Great Britain is given in a book by that title just published by The Society of Motor Manufacturers and Traders, Ltd. The latest publication is the second annual number which corresponds in general purpose to "Facts and Figures" published in this country by the N.A.C.C.

Road construction and repair is important to the motor industry in Great Britain as it is in this country so that a great deal of information concerning it is given. At the end of 1926 there were 178,361 miles of road in Great Britain of which 24,552 or 13.7 per cent were Class 1 and 15,624 miles or 8.7 per cent were Class 2.

Total road expenditures for the fiscal year 1924-1925 were well over $250,000,000 of which about 67 per cent was obtained from local taxation, 26 per cent from payments under grants from the Road Fund, and a little less than 5 per cent from specific highway revenue other than "rates" or local taxation.

One of the main obstacles to a more rapid adoption of motor vehicle transportation in Great Britain is seen in data concerning motor vehicle taxes. The average license fee for a car in Great Britain is something like $50 as compared with, possibly, about $15 as an average for the United States. The base rate for license fees is approximately $30 and applies to all cars with rating of six horsepower or less and $5 in addition is charged for each unit or part unit horsepower over six.

Since the rating of the smallest engined American car on the British market is about 16 hp., it is evident that the buyer of such a car must pay about $80 a year for the privilege of operating it.

The very strong influence of this factor on the British market is evidenced by the fact that over 70 per cent of all cars in use are rated at less than 16 hp. Over 25 per cent are rated at 12 hp., 11 per cent are rated at 14 hp., while only about 30 per cent of the cars now in use are within the power range of American-built cars.

At the end of 1926, according to this survey, there were in Great Britain 686,000 private cars, 260,000 trucks, 101,000 hackneys, and 18,000 exempt vehicles, making a total of 1,065,000 motor vehicles exclusive of motorcycles, of which there were 629,000 in use.

The United States holds first place as a source of motor vehicle imports into Great Britain, with France second, Canada third, for the first six months of 1927, and Italy fourth. During the first six months of this year our exports to Great Britain of passenger cars have been nearly 2000 more than during the whole of 1926 while exports from Canada have increased in proportion.

In 1926 we were second to France as a source of truck imports but for the first six months of this year have taken the lead, although total exports have been small in both cases.

During the first six months of 1927 the United States has been second to France in exporting pneumatic tires to Great Britain and also in the inner tube trade, but we have quite a margin over all other countries in our solid tire exports.

Motor vehicle production for 1926 is given as 138,500 passenger cars and 41,500 trucks, making a total of 180,000 vehicles.

Prices of motor vehicle products in Great Britain have followed the same trend as in this country, showing constant decreases in spite of rising wages and prices in general. Assuming the average for 1914 as the index number 100, for 1927, car price index is 88.4, cost of living 167, wholesale prices 153 and earnings in the motor industry 202.2.

For the first six months of 1927 Great Britain exported 21,270 units, or 6.7 per cent of all exports made by the principal producing countries, which may be compared with 214,435 or 68 per cent, the figures given in the book for United States exports for the same period. During 1926 Great Britain exported 18.3 per cent of its total production as compared with 28.4 per cent for France, 36.1 per cent for Canada and 7.2 per cent for this country.

These are only a few of the many items of interest contained in the book. Those interested in further details should write to the S.M.M. & T. at 83 Pall Mall, S.W. 1, London.

THE Central Statistical Bureau of the Kingdom of the Netherlands has recently published figures regarding the number of motor vehicles in service in that country, indicating a large increase over the figures published previously. It should be pointed out in this connection that the registration of motor vehicles was not satisfactorily regulated until the going into effect of the law of July 4, 1925, and that for this reason all previous statistics were incomplete. The figures given below relate to the numbers of cars of different types in use in October, 1926:

Private passenger cars	29,130
Motor ambulances	69
Motor buses and coaches	2,371
Motor trucks	15,539
Motor tank wagons (gasoline)	160
Tractors	619
Motor patrol wagons	3
Total	47,891

The number of trailers in use was 600. Automobiles belonging to the Royal family and to foreign states or their official representatives are not subject to registration.

Larger, Higher—

New eight-cylinder model introduced in six body styles. Camshaft is driven by roller chain.

Above—A view of the new Marmon "78" sedan from the front. Note how the fenders are tipped with the Marmon pyramid design, which is also carried out on the radiator shell. Speed is symbolized by the "streaked-lightning" design on the radiator

Right—View showing finish of upholstery and interior hardware in Marmon "78" sedan

ENTIRELY new body designs, more roomy interiors and an engine of increased displacement and considerably increased power characterizes the Marmon "78," which has just been announced to take the place of the "Little Marmon," introduced last year. A maximum horsepower of 86, speeds between 70 and 80 m.p.h. and acceleration from 10 to 50 m.p.h. in 15 seconds are claimed.

The "78" will be produced in six body styles, ranging in price from $1,895 to $1,995. Closed types include a five-passenger sedan, a two-passenger coupe and a victoria-coupe, while the convertible and open types are made up of a convertible coupe-roadster, a two-passenger roadster and a four-passenger speedster.

By the uses of a hypoid gear final drive and a 4-in. rear kick-up in the frame a low construction is obtained. On the sedan a panel extends across both doors on one side, and a similar effect is produced on the victoria-coupe.

Features of the interiors include walnut garnish moldings, figured bronze hardware and instrument boards decorated to conform to the general effect of the upholstery. Each body type will be available in a variety of colors, all based on the jewel effects introduced by Marmon this year. Micha Schist gray, Emerald green and various combinations of blue, maroon, gray and brown are available for the five-passenger sedan and the victoria-coupe.

The radiator has been increased in size for the sake of appearance and also to increase its cooling capacity. Fenders are wider and are full crown of the high pitched type. The familiar Marmon pyramid has been incorporated on the front tip of each fender.

A new type of nickel-plated, parabolic, depressed-beam headlight is used to conform to the general front design. These headlights are mounted on nickeled standards and are braced by a cross-bar extending to the fenders. Cowl lamps are mounted on a cowl surcingle on which are mounted also the brackets for the side-mounted wire wheels.

Tread is Widened

The tread has been widened and is now 56 in., allowing wider seats in both the front and the rear section. Form-fitting cushions are used, and the gear and brake levers are so located as to make it possible to enter the front seat without discomfort.

Broadcloth and Bedford cord upholstery is used. The instrument board is in color to harmonize with the upholstery, the instruments being grouped in a panel of etched bronze, indirectly lighted.

On all open cars the windshield folds forward. The nickel-plated steering column is adjustable as to tilt, and brake and clutch pedals are adjustable as to length. The 19 in. steering wheel is flat and provided with a ribbed grip.

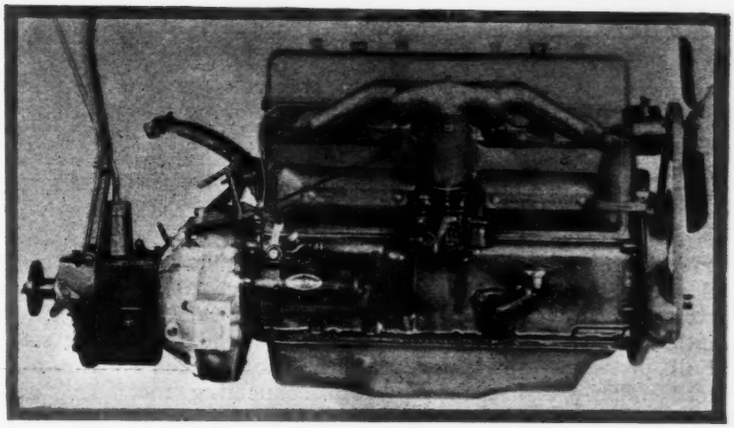
Outstanding among the features of the new powerplant is the duplex down-draught manifolding system. This manifold, as the name implies, is in reality

Compression Engine *in* Marmon "78"

By M. Warren Baker

two manifolds with the inner section feeding cylinders Nos. 1, 2, 7 and 8, and the outer section feeding cylinders Nos. 3, 4, 5 and 6. One carburetor is used to feed both manifolds. The engine, which is of the valve-in-head type, develops 86 hp. at 3400 r.p.m. Engine, clutch and transmission form a compact unit which is mounted on the frame at four points. The bore has been increased from 2¾ to 2 15/16 in. while the stroke remains 4 in. There also has been a further increase in the compression ratio which is now 5.5 to 1.

A double roller chain drives only the camshaft. The fan, generator and water pump are driven by a belt off the crankshaft. The camshaft is mounted on five bearings with diameters graduating from 1⅞ in. at the front to 1 7/16 in. at the rear, to allow easy removal from the front end.



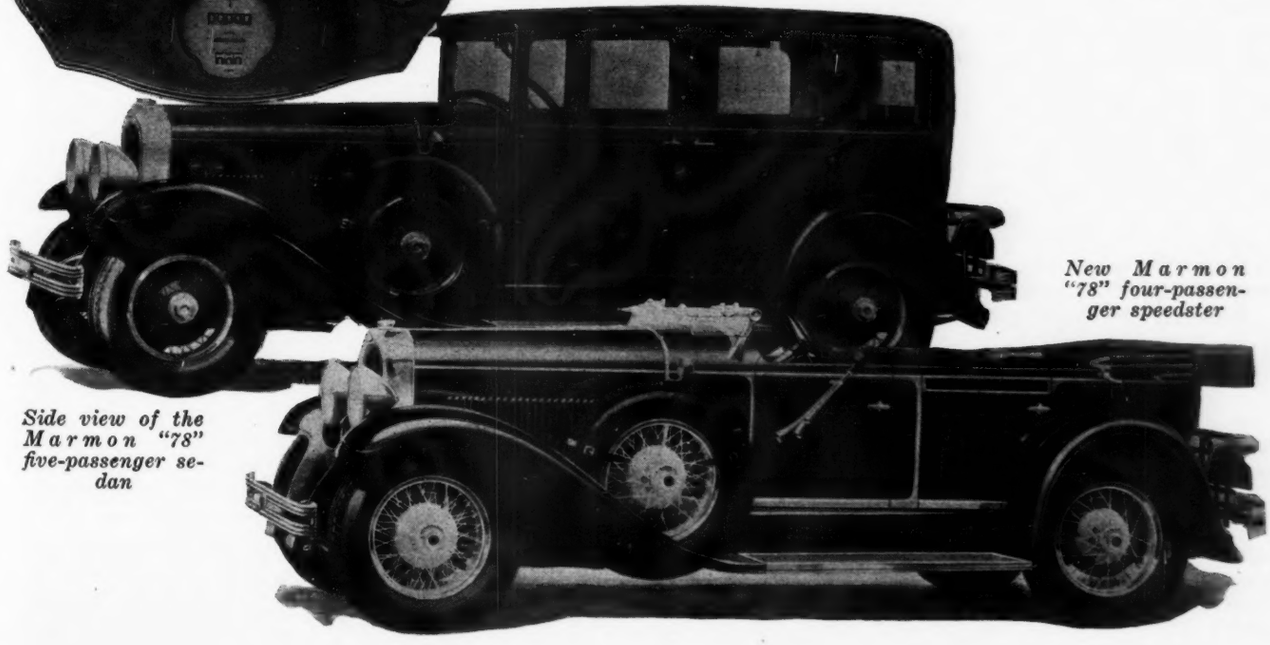
Right side of new Marmon engine, showing new type duplex down-draught intake manifold

Intake valves are made of tungsten steel and of the tulip type, with a nominal head diameter of 1 29/64 in. Tappet clearance is 0.008 in. hot, and the spring pressure is 120 lb. The valves lift 21-64 in. and are lubricated by force feed. The exhaust valves have Silchrome heads and tungsten steel stems; they have a nominal head diameter of 1 17/64 in.

The crankshaft is mounted on five main bearings of 2 3/16-in. diameter. Crankshaft thrust is taken on the front bearing, which has a length of 1 17/32 in., the lengths of the other bearings being 1⅛, 1⅞, 1⅛ and 1⅞ in., respectively. A torsional vibration dampener is used.

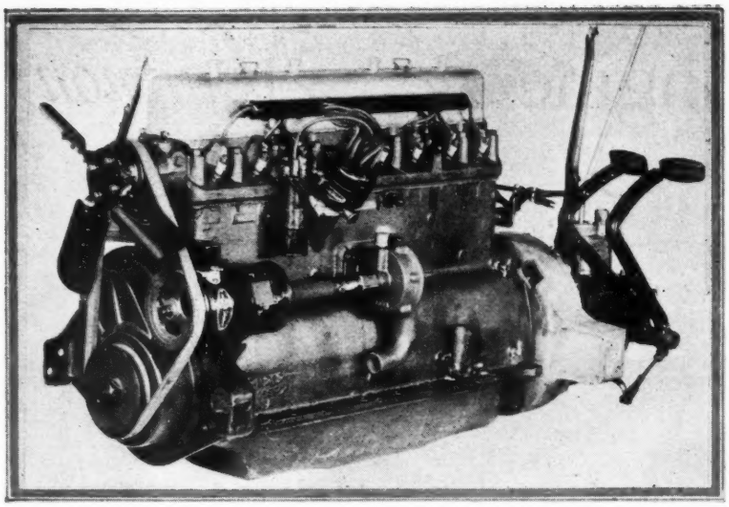
Lynite split-skirt pistons of very light design are used, the weight of the piston with pin and rings being only 13 oz. The pistons are 3 3/16 in. long.

The Marmon instrument panel



New Marmon "78" four-passenger speedster

Side view of the Marmon "78" five-passenger sedan



Left side of Marmon "78" engine, showing arrangement of generator, water pump and fan

Perfect Circle rings are used at the top and bottom and a McQuay-Norris compression ring in between. Piston pins are 47/64 in. in diameter and 1 in. in length, the bearing being in the connecting rod.

Full pressure lubrication is used, the oil being forced under-pressure to the main connecting rod, piston pin and camshaft bearings and to the timing gear, by means of a gear pump, the normal pressure being 40 lb. p. sq. in.

Other features of equipment include a Wall oil filter and distillator, a thermostat in the cooling system, a Fedders cellular radiator (cooling system capacity 5 gal.), a Stromberg 1¼-in. carburetor, a Stewart vacuum tank and an Alemite gasoline filter.

The Delco-Remy distributor is mounted on the side of the cylinder block at an angle, being driven by spiral bevel gear off the camshaft. It is of the semi-automatic type, with 20 deg. of manual and 25 deg. automatic advance. The starter motor also is Delco-Remy, and engages by a Bendix pinion. The battery is located under the left front seat.

Chassis features include Alemite Zerk fittings for lubrication and a Fedco theft-proof serial number plate. Springs are mounted in rubber cushions. The frame is made of carbon steel of ⅛-in. stock, 6 in. in depth and with flanges 2 in. wide. A steel plate 16 in. wide takes the place of the rear cross member, and there are two gusseted cross members, one tubular cross member and the four engine supports, making for extreme rigidity of the chassis.

Transmission Ratios

Transmission ratios are as follows: Low, 3 to 1; second, 1.75 to 1; high, 1 to 1; and reverse 3.875 to 1. A Hyatt roller bearing is used for the pilot and the main shaft is mounted on ball bearings, while the reverse idler and the secondary cluster gear are mounted on bronze bushings.

A 10-in. single, dry disk adjustable clutch is used, with Raybestos molded facing. Two Spicer metal universal joints are incorporated in the propeller shaft. Both drive and torque are taken through the rear springs.

The rear axle is a semi-floating type, with a gear ratio of 4.9 to 1. Hypoid gears are used for the final drive, and the minimum road clearance is 8¾ in. The pinion shaft is mounted on ball bearings. Pinion adjustment is by shims.

The Salisbury I-beam front axle has a clearance of 7½ in. The king pin has a transverse inclination of 7 deg. while the spindle has an inclination of 2 deg. and the castering angle is 4½ deg. The toe-in is 3/16 in. Four-wheel Bendix mechanical brakes are standard equipment, the braking action being equally divided between front and rear wheels. The brake linkage has been simplified. Both drums have a diameter of 12 in. and a lining width of 1¾ in., which gives an effective braking surface of 224 sq. in. The brakes are of the internal type and act as both service and emergency brakes.

A cam and lever steering gear is provided, with a ratio of 15.15 to 1, the minimum turning circle diameter being 40 ft. Semi-elliptic springs are used all around, front springs being 38 3/16 in. and rear springs 56 9/16 in. long, and both 2 in. wide. Nine leaves of chrome-vanadium steel are used for the front and 10 leaves for the rear springs.

Standard equipment on the "78" includes automatic windshield wiper, a cowl ventilator, an engine heat indicator, a gasoline gage, a cigar lighter, a sun visor, a rear traffic signal, cowl lights, vanity and smoking sets, a clock, transmission and tire locks, a spare rim, a Delco-Remy Klaxon horn and a tire carrier.

Gaseous Explosion Phenomena

IN discussions of explosion phenomena it has been generally assumed heretofore that combustion is completed at the moment the highest pressure is reached in the combustion chamber. In a paper on "The Ideal Efficiency of Internal Combustion Engines," by Prof. W. T. David, read before the British Association for the Advancement of Science at Leeds recently, experiments were described which are claimed to show that even in explosions of pure gases, chemical equilibrium is far from being attained at the moment of maximum pressure.

It was found that when gaseous mixtures of given calorific value are diluted with a given volume of diatomic diluents, the maximum pressures developed on explosion depend very much upon the nature of the diatomic diluents, in spite of the fact that the specific heats of the diatomic diluents are substantially the same and their volume was such in some of the experiments as to keep the temperature of explosion well below that at which temperature dissociation becomes appreciable.

Professor David does not attempt an explanation in molecular terms of what is meant by incomplete combustion; what he meant when using it was that the chemical energy of the charge had not been completely converted into thermal energy in equilibrium with temperature.

TWO German cities, Berlin and Magdeburg, have introduced an automobile pilot service. This service consists of men—10 in Magdeburg and 50 in Berlin for the present—which for a nominal charge pilot motorists who are unfamiliar with the city, through the city or to any desired address, or act as guides to the sights of the city. The pilots for the most part are professional chauffeurs out of work. In Berlin the service is being conducted by a Central Association of Motor Vehicle Owners, which probably means taxicab or public service vehicle owners.

Fiat's New 91½ Cu. In. Racer Said to Develop 175 Hp.

Turns over at 8000 r.p.m. Has 12 cylinders in two parallel rows of six with two crankshafts united by gearing. Plain instead of roller bearings are used.

By W. F. Bradley

WITH 12 cylinders in two parallel rows of six, mounted on a common crankcase and having two crankshafts united by gearing, the new 91½ cu. in. racing Fiats are a distinct departure from anything yet produced in the racing world. These engines were begun nearly two years ago, when experiments with a two-crankshaft, supercharged, two-stroke engine were abandoned.

While not the first engines of this type to be built, for Bugatti designed and produced an aviation vertical dual six during the war, the Fiats undoubtedly are the first successful racing engines of their class in the world. Fiat claims for speed and power are usually very conservative and there is no reason to doubt that these engines develop 175 hp. at 8000 r.p.m. and that they have been held at this power for more than a few seconds. This doubtless is the highest power ever obtained from an engine of 91½ cu. in. piston displacement. During practice on Monza track, Bordino broke all local records and in the recent Milan Grand Prix, with an engine which had not been run in, he made the fastest time of the day.

Valves Inclined in Head

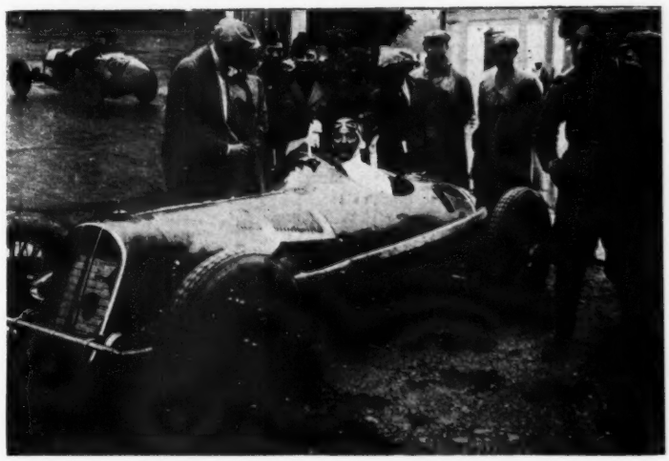
Cylinders are steel forging, united in pairs by a sheet steel water jacket; the two rows of six are mounted on a common crankcase with the minimum amount of space between the two. Cylinder bore is 52 mm. (2 in.) and piston stroke 58 mm. There are two valves per cylinder inclined in the head and operated by three overhead camshafts from a train of spur pinions at the rear. The exhaust camshafts are on the outside, while intake camshaft, which is common to the 12 cylinders, is in an aluminum housing between the two rows.

A Rootes type blower, running at engine speed, is driven off the front end of one of the camshafts and sucks mixture through a Fiat carburetor. The gas tank is under pressure at the rear, the gasoline being pumped up to a tank on the cowl and fed to the carburetor by gravity. Two magnetos are used; these are driven off the end of the engine and have their distributors close to the driver's hand, under the cowl. The engine fires as a double six, there being a simultaneous explosion in the cylinder No. 1 of A group and cylinder No. 6 of B group.

Spur gearing unites the two crankshafts. This gearing is at the rear of the engine and does not give any reduction to the driveshaft, which consequently turns at engine speed, the only reduction being in the rear axle. Whereas Fiat was the first to make use of roller bearings for crankshaft and connecting rods, and gave the lead to other European manufacturers in this respect, the new engine has plain bearings throughout, and is the only high-class racing engine in Europe with plain bearings.

Engine, clutch and gearbox are a unit construction. The clutch is a multiple disk type running in oil, and the transmission provides four speeds ahead and reverse. The gears are positively lubricated by pump, the oil also being carried to the clutch and the forward universal joint. Engine lubrication is in the usual manner with one feed pump and a scavenger pump, the supply of oil being contained in a separate tank by the side of the driver. To get better balance the powerplant is slightly offset in the frame. Springs are semi-elliptics front and rear, the front pair having their ends received between rollers. A three-piece flanged and bolted tubular front axle is used. The rear axle housing is machined out of the solid. The torque tube and the differential housing are one unit, with the axle housings bolted to the differential housing.

The Fiat has a considerably inclined radiator and, while no lower in front than some of the latest French cars, appears to be much lower at the rear. Mechanical brakes are on the four wheels and are operated by pedal through a friction servo mechanism. The hand lever operates the four brakes direct.



New Fiat 12-cylinder, 91½ cu. in racing car which is said to develop 175 hp. at 8000 r.p.m. This picture was taken at the Milan Grand Prix

Continental Has New *Eight-Cylinder* Passenger Car Engine

Counter-balanced five-bearing crankshaft, large main bearings, double carburetor and special manifold construction are leading features. Piston displacement 268 cu. in.

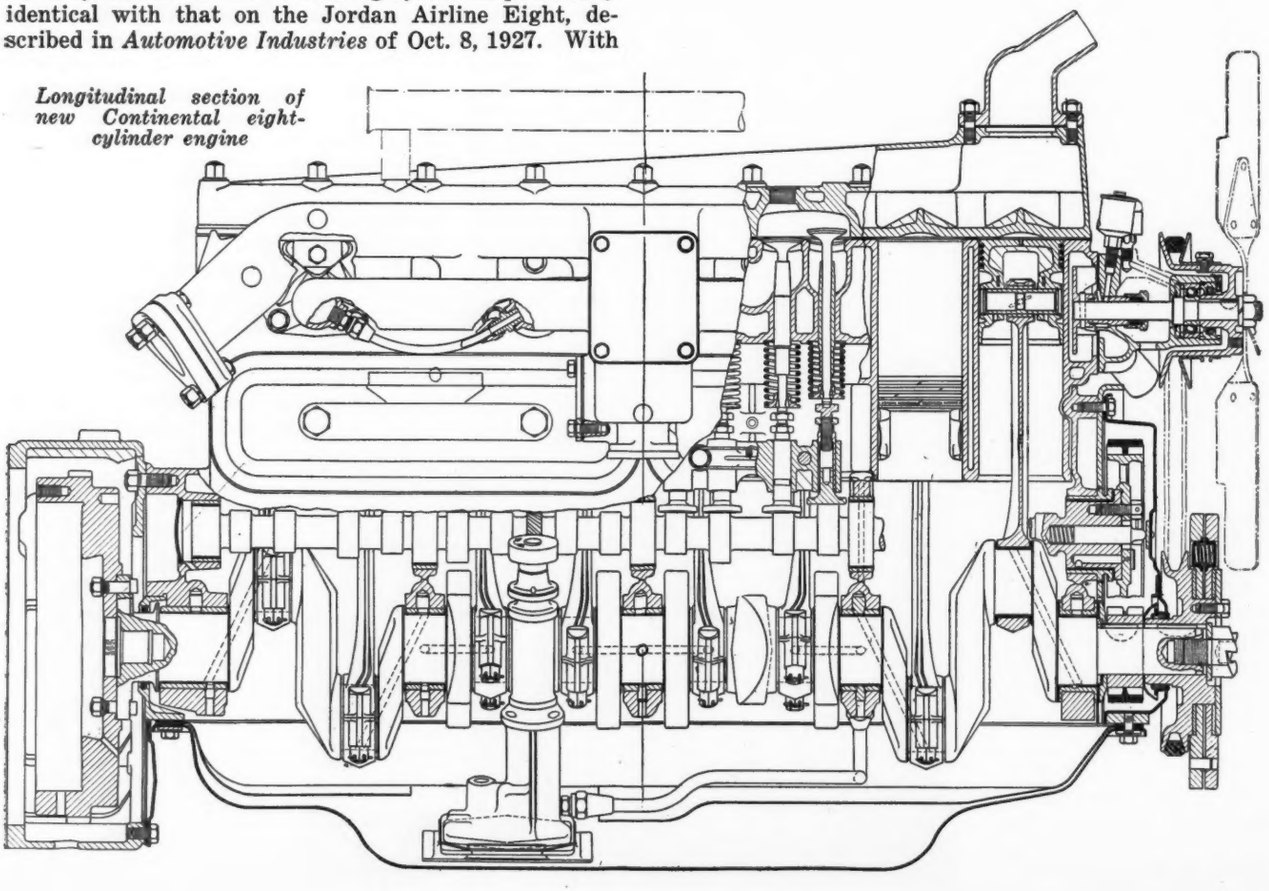
By A. F. Denham

A NEW straight eight L-head engine is now being offered by Continental Motors Corp. for use in passenger cars. Leading features of the engine are a counter-balanced five-bearing crankshaft, large main bearings, compact construction giving a low weight power ratio, and the use of a double carburetor and special manifold construction.

The new engine develops a maximum of 85 hp. at 3100 r.p.m., while its torque reaches a maximum value of 170 lb.-ft. at 1600 r.p.m. It has a bore of 3 and a stroke of 4¾ in., giving it a piston displacement of 268.6 cu. in., and it operates with a compression ratio of 5 to 1, so it can be run on any standard fuel.

Mainly responsible for the good performance of the engine is said to be the use of a double carburetor and of an inlet manifold supplying charge from one mixing tube to the four inner and from the other to the four outer cylinders. This manifolding system is practically identical with that on the Jordan Airline Eight, described in *Automotive Industries* of Oct. 8, 1927. With this arrangement there is no overlapping of intake periods of cylinders drawing charge through the same passage.

Supported in five main bearings, the 2⅜ in. crankshaft is counter-balanced on the 4th, 6th, 7th and 9th crankcheeks. This is done to reduce the load on the center main bearings, which carry the heaviest load in any given engine. Counterbalancing of the shaft has been adopted, moreover, in order to keep the necessary lengths of these center bearings down, so as to obtain the utmost compactness and lightness possible. Through this method of balancing at the center bearings, only, the load on the bearings is uniform throughout and although the horsepower peak is at a rather high speed the engine can be run at this speed without overloading any of the main bearings. The evenness with which bearing loads work out is emphasized by the fact that



Longitudinal section of new Continental eight-cylinder engine

except for the rear bearing, which is 2⅜ in. long, all main bearings are of the same length, 1⅜ in.

Rigidity is maintained by extending the crankcase, which is integral with the cylinder block to 2½ in. below the centerline of the crankshaft. Torsional vibration is guarded against by a Lanchester torsional vibration damper on the front end of the shaft.

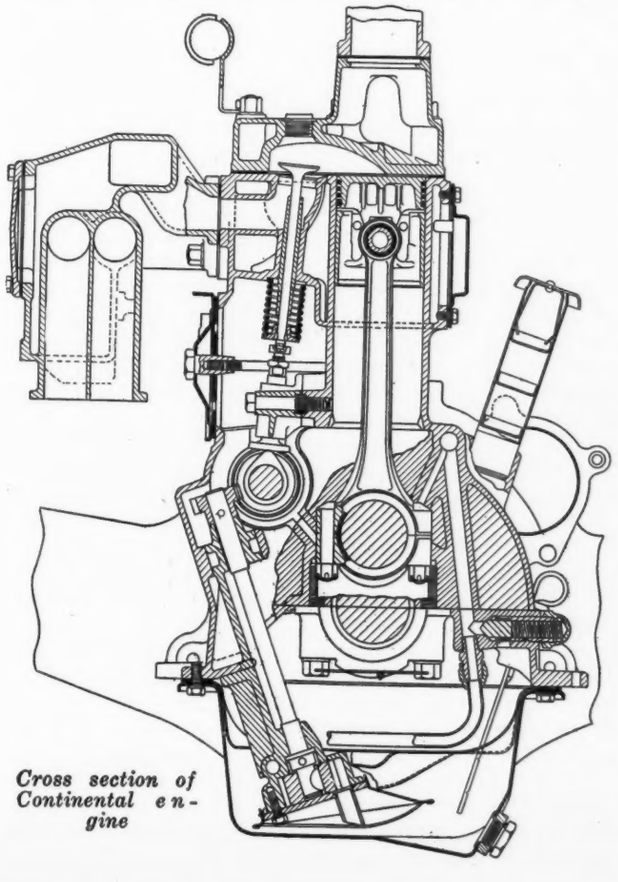
Crankpins are 2¼ in. in diameter and have a length of 1 5/16 in. Piston pins are full floating, 55/64 in. in diameter, with total bearing lengths of 1 in. in the rod and 1 3/16 in. in the four-ring, invar-strut aluminum-alloy piston, the latter being fitted with a clearance of .002 in. The connecting rods are of more than twice the length of the stroke, being 9¾ in. long.

Silicon-chromium steel is used for the exhaust valves, which are fitted with a taper lock at the lower end. Valve springs are of a new design, said to eliminate surging at high speeds. Tappets have chilled cast-iron faces. Five bearings are also used to support the 1⅛-in. camshaft, these bearings being of the following sizes:

No.	1	2	3	4	5
Diameter	2 5/16	2¼	2 3/16	2⅛	1¾
Length	1 11/16	⅞	⅞	⅞	1

A ½ in. pitch Morse chain is used for the front-end drive, adjusted by swinging the generator. Fan and water pump are mounted in a unit at the front of the cylinder block, these units being driven by a V-belt. Adjustment for wear of the belt is obtained by turning the front end of the fan pulley. The fanshaft itself runs on a ball bearing. Water is delivered to the blocks through a stamped header which also serves as a cover over the large opening in the casting which is left to facilitate cleaning of the inside of the block at the foundry.

Lubrication is by pressure feed to main bearings, through the drilled crankshaft to connecting rod bearings, and to camshaft bearings and timing chain. Engine suspension is of the four-point type.



Cross section of Continental engine

Improvement in Chromium Plating

ACCORDING to Dr. W. Pfanhauser, writing in *Der Motorwagen* of Oct. 31, one of the difficulties in chromium plating is due to the occlusion of large volumes of hydrogen in the deposited chromium. The author himself ascertained that with a current density of about 1/3 amp. per sq. in., the chromium deposit takes up from 200 to 250 times its volume of hydrogen (at atmospheric pressure). With a current density of 2/3 amp. per sq. in. this hydrogen content rises to 800 volumes, and with a current density of 1 1/3 amp. per sq. in. it attains 2000 volumes.

It is no wonder that chromium deposits with such a large hydrogen content begin to crack soon after completion, and often scale off from the base metal. Before this scaling or flaking occurs, air and other corroding agencies enter and cause the base metal to corrode. That objects which were chromium-plated in this way were no recommendation for the process is obvious, observes Dr. Pfanhauser.

Dr. von Bosse, a German research worker, has developed a method of removing the hydrogen occlusions after the plating process is completed and before cracking begins, without materially raising the temperature of the plated articles. Attempts have been made in the past to remove the hydrogen by heat treatment, by heating the plated objects either in furnaces or muffles, or by dipping them in lead baths, etc., but it was always found that such sudden heating causes the chromium plate to crack and corrosion to set in shortly.

According to the new process of Dr. von Bosse, the hydrogen is removed in a vacuum chamber, on the principle of electrode disintegration. The plated articles, no matter of what metal, are secured by means of suitable holding devices to electrode rods inside the vacuum chamber, the same as in plating practice. After the chamber has been evacuated by means of quick-acting air pumps to a high degree of vacuum, high tension alternating current is applied to the electrodes. A certain radiation then emanates from the electrodes, which carries the hydrogen along, and the gas is immediately removed by the vacuum pumps.

Evacuation of even large chambers can be effected in a few minutes and requires only little power, and the removal of the hydrogen takes only from five to 10 minutes with chromium layers of normal thickness. The completion of the process is indicated by instruments suitable for the high vacuum. On the other hand, the experienced eye can see it directly through peep holes in the walls of the vacuum chamber, as the emission of light from the articles changes as the process nears completion.

An important factor in this connection is said to be that the process removes hydrogen not only from the chromium plate, but also from the base metal, especially copper, brass, iron, steel, etc. The knife edges of surgical instruments, for instance, sometimes are so hardened by hydrogen absorption during the chromium plating process that they crack after plating, whereas if the hydrogen is removed by the process described the instruments have the same normal hardness after chromium plating as before.

The Langbein-Pfanhauser Works of Leipzig and Vienna have taken over the manufacture of the apparatus required for working the von Bosse process.

James C. McLaughlin

Still Hope That *Entire* 3% Automobile Tax Will *be* Repealed

If resolution to this effect carries in House, Senate is almost sure to fall in line.

By James C. McLaughlin
Representative from Michigan and Member of House Ways and Means Committee

REPEAL of the 3 per cent excise tax on automobiles is not a matter of dollars but of principle. The automobile industry, prime mover in the fight now being waged for the complete elimination of the tax, has no selfish motive in urging its repeal. The industry does not pay the tax, but merely acts as a collection agency for the United States Government.

The position taken by the industry, a just one, is that the automobile is a necessity, and that unless the tax is removed there is grave danger that it will become a permanent part of the revenue structure of the Government, such as the tax on tobacco, narcotics, etc.

There is no refutation of the industry's contention that the tax is unjust and discriminatory and should have been repealed in toto years ago. If automobiles are to be taxed for highways, as part of the Federal Aid program, then the manufacturers' contention that it would be equally as logical to tax shipping for harbor and river improvements, a thing unthought of. The two propositions are on all fours.

The plea that automobiles compete with railroads, which must pay taxes, is far fetched in the light of figures just announced by the U. S. Bureau of Public Roads, that during the last fiscal year the 21,889,896 motorists of the country paid a total of $474,304,078 in license fees and gasoline taxes, while the expenditures of the Federal Government were less than 8 per cent of this sum for Federal Aid.

No other single industry has contributed more to the financial wealth of the country, nor to the railroads, than the automobile industry. It is admitted that trucks and buses have cut deeply into the short hauls of the railroad, but the fact that the public finds this method of transportation more economical than shipping by railroad is no argument for taxing the one because it competes with the other.

Taxes and license fees are local matters in any state and in many states they are put on the tax rolls as personal property. Whatever the Federal Government has spent in Federal Aid it has collected many times over from the motorists of the country, who are now justified in demanding the immediate repeal of the tax.

Highways admittedly are used exclusively by the motorist, but it does not follow that the country at large does not profit by them also. They are the backbone of a national defense. They are as much a part of the country's military equipment as the cannon itself. Without the road the cannon would be ineffective, as it could not be transported into the war sector.

The World War, if it did nothing else, clearly demonstrated the needs of an adequate national highway system. Had France been without it Paris, undoubtedly, would have been taken by the Germans in the first great offensive. It seems but sound reasoning that the Federal Government's contribution of $75,000,000 annually toward Federal Aid is but a just proportion of the national defense.

The fear expressed years ago by the automobile industry, that the tax might eventually be looked upon as a sales tax, was not without foundation. The Government now regards it as such and there is a determined opposition in the country to a sales tax and there is, and ought to be, a strong feeling that automobiles should not be singled out as the only necessity which must pay a sales tax.

Firm in the conviction, as I am, that the country does not want the 3 per cent tax and that it is not necessary nor essential toward the Treasury's revenue, I am offering a resolution on the floor of the House asking for its complete repeal and entertain high hopes that in an open discussion of this phase of the new revenue bill the tax has more than an even chance of being entirely eliminated. If it carries in the House the Senate will fall in line.

Just Among Ourselves

"After All, What's the Problem About?"

WITH the sleet beating on our windows its announcement that winter finally has come and with the strains of "Meditations" from the big organ at Roxy's still lingering in the room, the mood is scarcely upon us to write about "problems" of any kind—even those automotive problems out of which we get usually so much kick. We feel much more inclined at the moment to get into one of those aimless and endless discussions which used to furnish so much mental gymnastics back in college days and which might start—and end for that matter—with some such inanely posed query as, "After all, what is a problem anyhow?"

* * *

Visualization is Sometimes Faulty

CERTAINLY any automotive man could answer that question without much trouble so far as the citing of specific instances are concerned. Do we not argue daily and volubly about the used car problem, the replacement parts problem, the service problem and a host of other items readily and regularly cataloged under that general category of "problem"? Certainly we do. But we have a suspicion that lots of times our real difficulties arise from perhaps not visualizing very clearly just what does constitute a problem, the result being frequently a running back and forth over ground already covered a multitude of times so that progress toward a given goal isn't nearly so quick as it might be.

* * *

Head Toward the Attainable Goal

WHILE philosophers are notoriously for rarely getting on to any really practical conclusions, we have a weakness for pursuing their mental peregrinations more or less frequently in spite of that fact —or perhaps, as some of our friends have been unpleasant enough to suggest, because of it. Just the same, we got a thought about this automotive problem thing the other day when we read Count Keyserling's statement in "The World in the Making" that "only the problem which is *soluble* can answer to the bare concept of problem." He points out that if there were such a thing as the desirable "in itself" the whole of humanity would long ago have committed suicide, "for such a one as the individual might wish to be in the abstract has never existed." He suggests, in cases of discouragement, that the energies be diverted toward an attainable goal—the "short term objective" of our own previous discussions — "thus immediately disposing of the life problem on a high plane and rousing a feeling of happiness."

* * *

Would Further Cause of Automotive Unity

THE more intensive application of some such idea to our current investigations and argumentations about automotive questions of various kinds, from an individual as well as from a group standpoint, might very well result in the elimination of much of the waste-generating acrimoniousness which characterizes some of them and better enable the industry to coordinate the interests and thoughts of all of its members.

* * *

Advertising of Studebaker's Records

IF the foregoing paragraphs have the earmarks of being a bit too "preachy" for the taste of some of our readers, we can only plead the influence of the day on which this is being written—it happens to be Sunday—and our only too well known proclivity for carrying out as regards sermons the biblical dictum that it is more blessed to give than to receive * * * * But to get down to at least one specific matter before reaching the end of the page, we feel constrained to make mention of Paul Hoffman's rather illuminating reply to criticism of Studebaker's advertising of its recent achievements in breaking stock car records.

* * *

Only Way to Get Stamina Idea Across

COMMENTING on the reasons behind the Studebaker advertising, Mr. Hoffman sums up in these words: "Present-day merchandising demands presentation of proof of the quality of a product in a forceful, dramatic way. We knew the endurance built into the Studebaker Commander. The only way we could translate the idea of this stamina to the public in terms which could be readily understood was to institute a test unparalleled in automotive history." We agree with Mr. Hoffman. While we do not see any special benefits accruing from stock car racing, as racing, we do see very marked advantages which may come from various kinds of certified and officially supervised tests of individual cars such as those which have been run in the last year by Studebaker, Stutz, Auburn and others. So far as speed itself is concerned, moreover, it seems to us that modern life and modern conditions demand safe, individual transportation at higher speeds than previously were common. Speed *per se* has yet to be proved to be the one primary cause of accidents that many people seem to assume it is; speed in relation to surrounding circumstances is the thing to be considered rather than merely m.p.h. in itself.—N. G. S.

Group *Bonus is* Important Factor *in* Delco-Remy *Production*

C. E. Wilson describes results obtained in his plant by use of modified Bedoe premium system for payment of men. Tells how various business problems are met.

SOME interesting sidelights on business and production methods in an electrical equipment plant producing original equipment for car manufacturers were given in a talk by C. E. Wilson, president and general manager of the Delco-Remy Corp., at the November meeting of the Indiana Section of the S.A.E.

Briefly tracing the historical development of practice in the equipment business, Mr. Wilson said: "Years ago we used to get a contract from an automobile company for 5000, 10,000, 20,000 or 50,000 sets of equipment, whatever they thought they would use for a year. We would then go out into the market, buy material on the basis of that contract, and start to fabricate parts. In those days we had a very large inventory with relation to our monthly shipments; we had serious losses from cancellations and engineering changes, and usually our customer either wanted twice as much as he said he was going to take, or about one-tenth as much. So it finally developed that that was a poor way to run an accessory business."

As to present-day methods Mr. Wilson had the following to say:

"We now handle the production like this: The first of each month we make a production schedule for that month, and the two months following. We don't ask our customers to give us a contract for a definite number of equipments for a year, but simply to assure us that their business is ours, and whatever they need they will buy from us.

"We then tell them that we are in the automobile business with them, that we will take care of their requirements; we won't complain about short schedules and we won't complain about having too much to do on too short notice. We appreciate, however, all the help we can get in forecasting our schedules. These schedules are made out with two columns, one showing shipments, the other the relations to the production departments of the factory.

Build Ahead of Schedules

"At certain times of the year we try to build ahead of schedules in order to eliminate a quick increase in production, and also to give our employees something to do in the slow time of the year. This happens to be the present month and December.

"This production schedule is then broken down into parts and finally into raw material, and requisitions are placed on the purchasing department by the material control section. The purchasing agents buy material, usually by the month, and in advance to take care of the production schedule. Materials which can be obtained from suppliers on short notice and of a standard nature, are purchased only a short time ahead. Other materials such as the diaphragm steel we use in some of our horns, which comes from Sweden, must be purchased six months ahead. The time for getting in materials, and the quantities purchased ahead, is left up to the production manager and the purchasing agent.

"To make our operations a little clearer, I thought it would be wise to explain what you might call our organization chart. The heads of departments report directly to the general manager. We have a factory manager, sales manager, chief engineer, production manager, chief inspector, service manager, controller, and personnel director, who report directly to the general manager and have control of all of the activities of the company.

"The factory manager is concerned with equipment, processes, expense of operations, personnel organization and for having at all times the equipment and capacity to take care of the schedule.

Production Manager

"The production manager, starting with the production schedule, is responsible for our inventory, for seeing that the equipment is shipped when the customers want it, and he has complete control of all materials and stocks until the final shipments are made to the customer. The purchasing is also under the production manager.

"We are talking about purchasing of materials and inventory. I might say that our bogey for inventory turnover is 12. In other words, our average turnover, figuring the cost of sales with relation to the value of the raw material, work in process, finished stock, is 12 to 1. That is many times better than it used to be under our old system of purchasing and production.

"The sales manager, chief engineer and controller have the usual duties that the titles imply. The chief inspector in our organization has somewhat heavier duties than is usually the case. In many organizations the chief inspector reports to the factory manager, but in our case he reports to the general manager and is responsible not only for the quality of incoming material, the quality of the parts and the finished product in the plant, but also for seeing that action is taken on all complaints from our customers' plants, regarding the quality of our production. It is up to the chief inspector to see that some action is taken regarding any complaint, whether engineering action or a change in the factory methods is necessary, or whether it is merely a slip on the part of his own inspectors.

"The wage payment plan in any organization is usually a very important one, and we have a modifica-

tion of the Bedoe system. The original Bedoe system is a premium system which provides for taking care of time studies of all operations and in setting standards with relation to the quality of the operator being time-studied, so that on the average they would make about 35 per cent premium. The Bedoe system provides for paying the operators above a certain definite standard for 75 per cent of the premium production. In other words, if a low normal production on a part amounted to 100 per hour, the operator at that production would be paid the base rate. If the production were increased to 150 per hour, the operator would be paid the base rate plus 75 per cent of the extra 50 produced, or, in other words, at the rate of 1.375 times the base rate.

"This Bedoe system was first introduced at Remy about eight years ago. Since then it has been modified by applying it to groups of workers, in many cases, instead of to individuals. We believe in the group methods of wage payment where the work is naturally progressive and each man performs an operation on a piece which is passed to him from the preceding operator, and where the amount of work he can do is really limited by the number of pieces passing through the group. Good examples of this type of production are, of course, the motor and generator assembly where the machines start in at one end in the form of frames and the parts are added to them, and each man performs his operation as the parts come along. Our motor armature production is another good example of progressive work.

Helping Each Other

"The second class of work which we believe in grouping is where operators can actually help one another in their work, and where a more highly skilled man can do the more difficult part of the work and less skilled operators can help in the group. The best example of this type of work is in the automatic screw machine department. Our old method of handling our screw machine work consisted of having a set-up man for each battery of machines. The operators were assigned to certain definite machines; for instance, they might be running three Acme screw machines, and the setup men changed the jobs on these machines from one piece to another and took care of trouble that might occur in the production.

"This setup man had no particular responsibility for the production, and the operators, when a machine was in trouble, were allowed a certain amount for the machine being down. The result was a decreased production from the department and a general controversy between the setup men and the operators.

"Our present system consists in grouping a setup man with the operators to cover a given number of machines, perhaps 15 or 20. The way the problem works out now, the setup man is paid a premium along with the operators on the total production from that group of machines. If the group operating these machines have a good bit of trouble, the operators will pitch in and try to get as many machines running as possible. Temporarily one man may start five or six machines instead of the three machines which he would formerly operate.

"Also in cases where we had day and night forces operating the same group of machines, the day and night men were included in the same group, so there was no controversy about who ran down the tools and who ground them and who spoiled the setups.

"The improvement made in our production after this group system was satisfactorily working in our automatic screw machine department was very surprising. The operators all made more money than they had ever made before; the capacity of the department was materially increased, and the quality of the work was also improved because there was no question about which group made it; the group was only paid for good work, and the net result has been very satisfactory.

"The third class of work which we believe in grouping is where the work is of such a nature that it is very difficult to keep track of the individual operations performed by the operators in that department. Our plating department is an example of this type of group work. The plating department operators are grouped and the total number or pounds of plated pieces are checked out of the department and standards are set on the basis of the total production from the department. It doesn't matter then whether a given operator is washing pieces or cleaning them or stacking them on racks, or what he happens to be doing, the men all pitch in and and do whatever work is at hand to be done, knowing that if each does his part, they can all make money from the total production from that department.

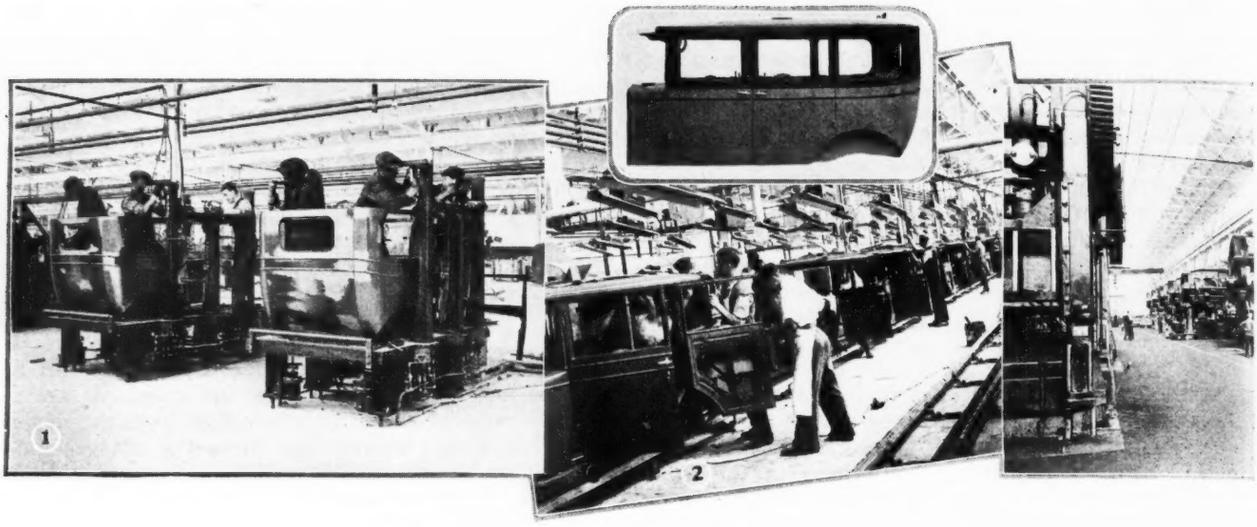
Didn't Work So Well

"There is another type of work which we have tried grouping, and which does not work out quite so well, an example being the generator armature winding. In this class of work, a number of operators are doing exactly the same operation. The time required for that operation is long enough that there is no difficulty in keeping track of the number of pieces produced by that operator. The work is also of such a nature that from a quality standpoint it is necessary to follow the work of individual operators. For instance, when the girls are learning to wind armatures, they don't do quite so well as experienced operators, and it is necessary to follow their work, to see that they are winding good armatures and to see that their production is increasing as it should.

"In some cases where a complete department, or in fact, practically a complete plant, has been grouped with the exception of a few examples like I have just cited, this work was also grouped. The only way we can group such operations with any satisfaction is to break the large group up into three or four smaller groups, keep track of the individual operators and classify them in the group they belong, depending upon the quantity of their production. In this way, the experienced operators are not penalized by the low production of the beginners. However, these groups, even then, are not nearly as satisfactory as the first three classes I described, and we only group this type of work when it is part of a big production setup and practically all other work is grouped, and then we group it from the point of view of the whole operation rather than of the efficiency of that particular production in itself.

Accurate Time Studies

"One of the important things in the progressive manufacture of interchangeable parts is to have accurate time studies set on all operations. At present 99 per cent of the labor in our plants is standardized. By that I mean it is paid for on a premium basis, according to the time studies. With such a complete standardization of the time of operations, it is possible for the factory manager to judge whether or not he has sufficient equipment and for the production manager to properly forecast the production requirements and make promises to the customers, which will be fulfilled."



Morris Building *All*-Metal Bodies With American Equipment

Plant which was organized by Budd Mfg. Co. is placed in operation by British car manufacturer. Has capacity for 1500 bodies per month.

By M. W. Bourdon

IN August, 1926, W. R. Morris (Morris Motors, Ltd.) concluded negotiations with the Budd Mfg. Co. of America for the installing and organizing of a plant, alongside the chassis-erecting plant at Cowley, Oxford, for the production of all-metal bodies of two types, sedan and phaeton. The buildings were completed and production was commenced on a small scale in February last. In October the plant was ready for its planned output of 1500 bodies per week, and apart from reduced schedules due to seasonal slackness it is now in full swing.

Besides presses for body units (panels, doors, etc.), the plant includes others with which all the press-work for Morris chassis is completed, frames and rear axle housings being the largest items.

Plant in Two Parts

The plant consists of two inter-communicating main shops, one devoted to material stores, pressing, riveting, electric and acetylene welding and body shell erection on two conveyors (one for phaetons and the other for sedans), the second shop being used for oil-base cellulosing, where four lines of conveyors are used in conjunction with drying ovens for sedans and phaetons together, and for two conveyor lines for roof fitting, trimming and detail finishing. On the opposite side of this second shop, parallel with the conveyors, the upholstery components are prepared, female labor being largely employed here. The entire plant has 426,618 sq. ft. of floor space.

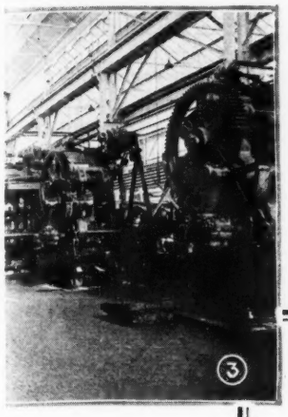
This organization is a separate company known as the Pressed Steel Co. of Great Britain, Ltd., and although at present bodies are made only for Morris chassis, it is at liberty to contract for other motor manufacturers, Morris having first call on the output capacity. The executives include Morris himself and a co-director of Morris Motors, Ltd., as well as representatives, for the time being, of Budd interests.

American cooperation was considered essential in equipping and organizing this enterprise, if only for the reason that it was desired to adopt the most modern of American systems of all-metal body construction. Apart from Austin, who has developed a constructional system of his own conception, no other British maker has adopted all-metal body work. The training of British labor and the organizing for production has been done by American officials, but the latter are continuously being displaced, as intended from the start, by British management, and at the moment of writing it is only a matter of weeks before American assistance can be withdrawn.

In the press shop two Hamilton presses are used for blanking and forming frame rails, and among the remaining heavy press equipment are five No. 1039 single-acting Hamiltons, three No. 796 double-acting Toledo machines, a single-acting No. 60 Toledo and three other double-acting Toledos, two being No. 177A and the other 180A.

Draws up to 8 in. at one operation are used for body panels and parts from 21 gage sheets, while among the units formed from heavy stock are brake drums drawn cold in four operations from ¼-in. stock, the

The photographs at the left show: (1) Two of the jigs for body assembly in the Morris plant. (2) Sedan body finishing line. Conveyor in foreground is devoted to phaeton bodies. Beyond sedan line are ovens for cellulosing. (3) Gang of Toledo presses. Insert—The all-metal sedan body produced in the Morris plant, which was equipped and organized by the Budd Mfg. Co. of Philadelphia



W. R. MORRIS, Britain's largest automobile manufacturer, besides being the founder and governing director of Morris Motors, Ltd., and its subsidiary companies, also owns Morris Commercial Cars, Ltd., and Wolseley Motors, Ltd. These and his many other industrial interests, connected either directly or indirectly with automobile production, cause him to occupy in England a position corresponding with that of Henry Ford in the United States.

Morris is 50 years of age. He was educated at a village school in Worcestershire and commenced his business career as an apprentice in the bicycle trade at the age of 16, but after a very short while he started to repair and sell bicycles on his own account. He had no engineering training, but has been described as a born engineer.

From bicycles he turned to motorcycles, then to garage ownership, in which sphere he has long been successful in Oxford at the time he conceived the first Morris-Oxford car in 1910. Prior to the war approximately 1500 chassis were erected from specially made components. After the war contracts were placed with the Hotchkiss plant at Coventry for power units, but in 1920 that plant was bought by Morris, and of late all components and nearly all bodies have been made in plants owned by Morris subsidiaries.

In certain cases the British material is unsuitable for such big draws as are possible on the same or similar machines in America, but British steel makers have undertaken to supply what is needed, when further economy in production will be gained.

Although the output at this plant of bodies and pressed chassis components is very large on British standards, it is, of course, in no way comparable with that of certain American plants, and the capabilities of certain machines are beyond requirements as applied to individual components. On that account, there is necessarily more changing of dies and resetting than occurs in the larger American plants. It is not required, for instance, that one press should be continuously producing rear axle casings; therefore it operates for periods on that unit alternately with other units. In no case are two presses required for the same unit.

Welding Used Extensively

Very few rivets are used in assembling the body, spot welding being mainly relied upon, with acetylene welding for filling up. All-metal jigs are used for each component and main assembly operation. In the press shop ordinary gas-filled bulbs are used for lighting, but in the spraying and finishing shop illumination is by mercury vapor lamps only.

Strictly speaking, the sedan is not an all-metal construction, but the term is justified in that, apart from two fillets in the interior, the only wood is that forming the frame of the roof, which has wire netting spread over it to support the padding and leather fabric covering. Various styles of leather and cloth are used for upholstery, while to discourage drumming the main body and door panels have thick felt glued to their interior surfaces.

The bodies made in this plant are those fitted to the Oxford (12 hp. and 14 hp.) and the new light six chassis. Those for the Cowley (12 hp.), the lower-priced range, are built elsewhere on the composite (wood and metal) system, as are other types of the Oxford range beyond the phaeton and sedan.

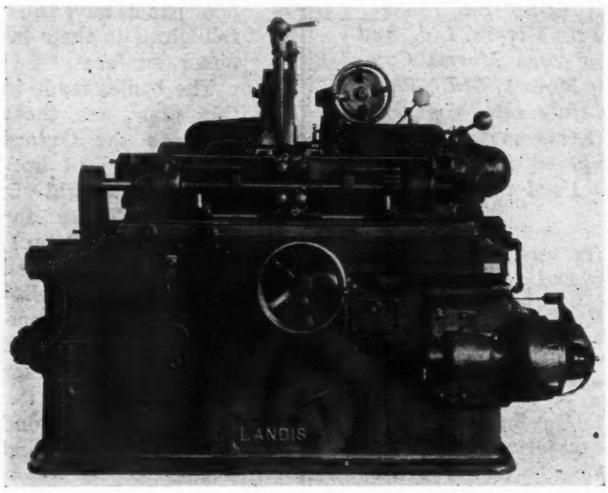
Morris does not standardize a fabric body of any kind, being almost unique among British makers in that respect. He claims that the all-metal body is as quiet as the fabric type, owing to the absence of screwed or other joints that can creak or rattle, and that it possesses an advantage that is undoubtedly lacking from both composite and fabric types, viz., an ability to protect the passengers from being crushed in case of an accident involving an overturn; in addition, that the danger of fire, which prevails with a fabric construction, is absent. Experience in England has been that fabric construction is especially inflammable when finished with pyroxylin.

NEW DEVELOPMENTS—Automotive

Landis Hydraulic Crankpin Grinder

A HYDRAULIC grinder specially adapted for production grinding of the crankpins of motorcycle, refrigerator and small stationary engine crankshafts, as well as the crankshafts of very small automobile engines, has been developed and marketed by the Landis Tool Co., Waynesboro, Pa. It is known as the 10 by 16 in. grinder and is available also in a 10 by 32 in. size.

Operation of the machine is very simple. On four-throw crankshafts, such as shown in the accompanying



Landis 10 by 16 in. Hydraulic Crankpin Grinder

illustration, the two end pins are ground first—from the rough forging. A spacing bar is used, and each end pin is supported with a work rest. When the center pins are ground a locating bracket is attached to the head, the spacing bar is changed, and the work rests are moved to the two center pins. The use of a locating bracket enables the operator to quickly get the inside pins on center before clamping the work in the carrying fixtures, while the spacing bar gives him facilities for speedily positioning the work carriage with relation to the pin which is to be ground.

The work is driven from both ends through silent chains and sprockets, power for the work driveshaft being supplied from the rear drive through a belt and several sets of silent chains and sprockets. Quickly operated clamps hold the work in accurately ground clamping blocks. Rotation of the work at 100 r.p.m. is controlled by a single lever at the front of the machine.

The massive grinding wheel head is equipped with an alloy steel spindle, hardened and ground, which runs in bronze-cap bearings lubricated under pressure. A 30 in. grinding wheel is used, the large size making for economy of wheel and diamond.

Hydraulic power rapid infeed to the grinding wheel head is furnished. The wheel moves toward the work at high speed until it starts to grind, when it automatically slows down to the pre-determined grinding feed and continues to move in at this slow feed until it comes against a positive sizing stop. Movement of the wheel away from the work is very rapid. Several convenient levers control the direction and speed of the feed. A hand feed, similar in design to the one used on previous Landis grinders, is also provided.

Power for the hydraulic wheel feed is furnished by a geared pump driven from the rear driveshaft, a portion of the base of the machine being used as a container for the oil.

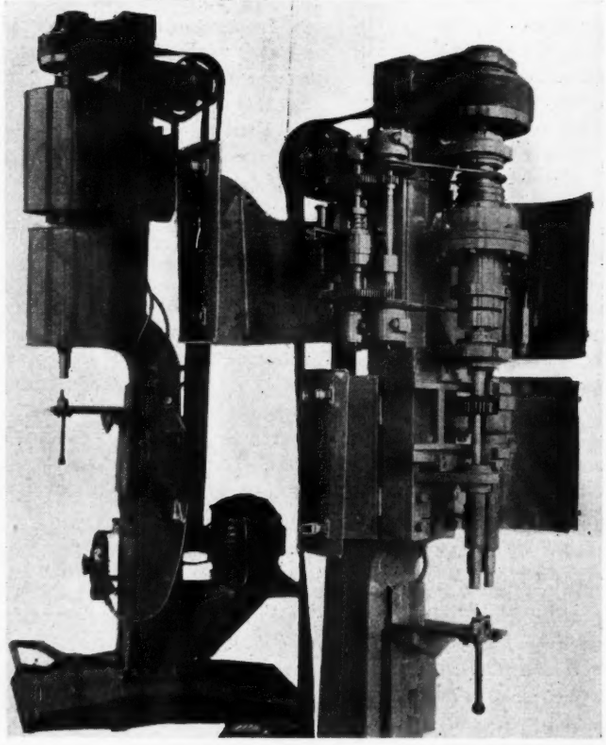
The work carriage is traversed by hand, a back gear arrangement giving a slow speed for truing the grinding wheel.

This machine may be arranged for either lineshaft or direct motor drive. For motor drive the motor is directly connected to the rear shaft through a flexible coupling. For lineshaft drive, a countershaft with tight and loose pulleys is provided and the drive is through a single belt to an auxiliary drive bracket which is mounted on the bed of the machine instead of the motor. As on the motor drive machine a flexible coupling transmits the power to the rear driveshaft.

Reynolds Nut-Driver

THE Reynolds nut-driving machine, which is equipped with two spindles, magnetic clutch and a differential and is designed for such jobs as assembly of connecting rod and main bearing caps, valve bonnets, motor end plates and similar work, has recently been placed on the market by the Metalwood Manufacturing Co., Detroit.

The machine consists of a column mounted on a base of large area. A vertically adjustable motor bracket is



Left—General view of Reynolds nut-driving machine
Right—Details of operating mechanism

Parts, Accessories and Production Tools

provided for a 2 hp. constant-speed motor, or countershaft drive can be furnished. The belt from the motor passes over idler pulleys to the driving pulley at the top of the machine. The lower end of the driveshaft terminates in a magnetic clutch with which is incorporated a differential through which two spindles are driven, one being driven directly from the differential and the other through a quill and idler gear. This second spindle is mounted on a cross slide so that the distance between the spindles is adjustable from 2 1/16 to 6 in. The spindles end in detachable socket wrenches.

Below the spindles are ways carrying a bracket which has a vertical motion from a foot-operated lever and to which the work holding fixture is attached.

In operation the nuts or cap screws are placed in the socket wrenches and are held there magnetically. The parts to be assembled are placed in the fixture in line with the spindles. Depressing the foot lever raises the work holding fixture and as the holding bracket moves upward it closes a contact switch which energizes the magnetic clutch and starts the spindles in motion.

As the lever is further depressed the nuts are driven to the desired tightness as determined by the adjustment of a rheostat placed in the magnetic clutch circuit. When the magnetic clutch starts to slip the mechanical switch opens the circuit, releasing all torque on the spindles and permitting the work to be withdrawn.

Filing System for Maps

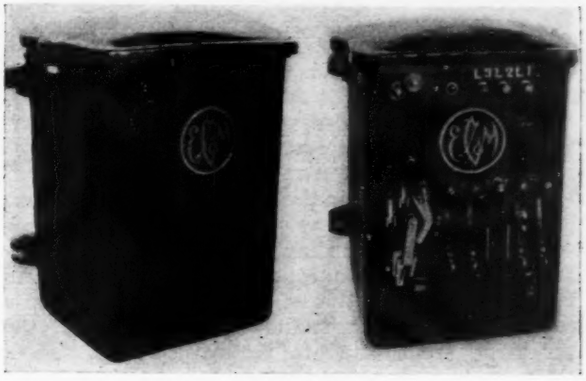
THE Globe-Wernicke Co., Cincinnati, Ohio, has recently developed a new system for filing drawings, maps and similar objects which are so large or of such varying sizes that proper filing of them is difficult. The nucleus of the system are clips composed of a strip of celluloid inclosed in India rubber adhesive cloth. One end of the clip is fastened to the drawing by adhesion while the other end contains a hole and a slit which permits its being snapped over a horizontal rod.

The illustration shows how the clips are used on index cards which may be used to facilitate location of particular drawings. The other view shows the method of arranging the suspended drawings in an inclosed cabinet, or they may be hung from an open rack.

How the clips of the Globe-Wernicke drawing filing system are used on guide cards and method of filing drawings with the Globe-Wernicke system

Iron-clad Starting Switches

THE Electric Controller & Manufacturing Co., Cleveland, O., is now supplying its standard type ZO "across-the-line" starting switches, for small alternating current motors, in iron-clad tanks, which makes them suitable for operation in atmospheres containing acid fumes. As in the standard EC & M type-ZO starting switch, all of the contacts, including the overload trip, open and close under oil, so that the starter is flame-proof. A machined fit between the tank and its cast iron cover makes the switch rain-proof.



Ironclad type of ZO starting switch, outside and phantom views

A GERMAN inventor has developed a spark plug which, instead of being screwed into the cylinder wall, is fixed by means of a so-called bayonet joint to a holder screwed into the cylinder wall. The shell of the spark plug proper is cylindrical and fits into a corresponding cylindrical hole in the holder, and a cap is then placed over the upper part of the plug and secures it to the holder by a one-quarter turn. The object is to make the removal and replacement of the plug a simpler, quicker operation.

THE Hungarian Government-owned machine works have secured a license for the manufacture in Hungary of the motor buses of the Daimler-Benz Co. Another Hungarian machine works, the Hungarian-Belgian Metallurgical Works, have secured a license for the manufacture of Minerva passenger cars.

New White *54* Bus Has *Interesting* Mechanical Details

Among features are positive valve stem lubrication, salt-cooled valves, a self-cleaning oil pump screen, two-spark ignition and special rear wheel fastening.

THE White Co. of Cleveland, Ohio, recently announced a new six-cylinder coach chassis, Model 54, with an engine of 519 cu. in. displacement, known as the 1A1. In the design of this engine, reliability, fuel economy, freedom from detonation and high specific power were aimed at.

The engine is of the mono-block, overhead-valve type, with a bore and stroke of 4⅜ by 5¾ in. A large diameter crankshaft with heavy crank cheeks and seven main bearings is used, and the crankcase upper section is of extreme depth, with each bearing point well ribbed to insure maximum rigidity.

The detachable cylinder head, which carries the valves in single file, together with the valve rocker arms and shaft, has been designed to facilitate service operations. The entire cylinder head assembly with the valves can be removed, and a replacement head quickly fitted, so there need be no delay for valve grinding.

A number of features in the valve actuation and lubrication have a direct bearing on reliability. Surrounding each valve stem is an inverted plunger cup operating in a small cast-iron cylinder. This construction permits copious lubrication of all working parts of the valve gear, and also prevents side thrust from the rocker being transmitted to the valve stems. As a result, valve stem wear and leakage are reduced.

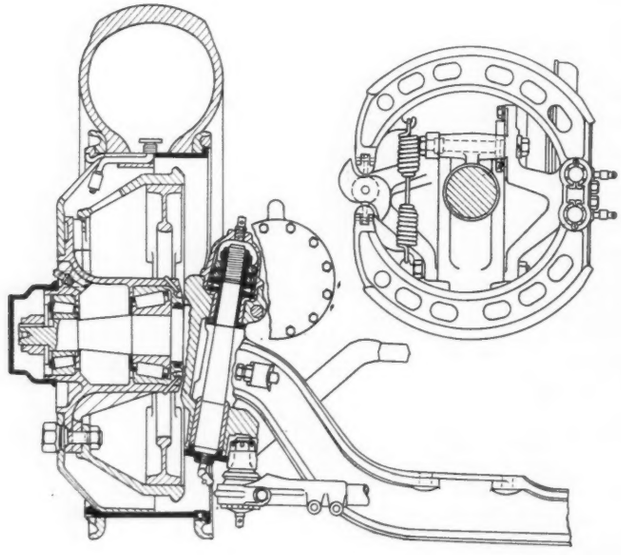
The exhaust valves are of the salt-cooled type, similar to those used successfully in aircraft engines which are called upon for continuous high output. The salt, which occupies approximately one-half the space in the hollow valve stem, becomes molten at a moderately high temperature. The molten salt is reciprocated within the hole in the valve stem by the motion of the valve itself, and acts as a mechanical conveyor to take heat from the valve head, and distribute it through the water-cooled portion of the valve stem guide. The valves are operated through the intermediary of push rods and overhead rockers, with a special form of pivoted cam follower which reduces wear to a minimum. The adjustment of the valves is simple and accessible, and the entire mechanism is completely inclosed and automatically lubricated.

The cylinders have the combustion chambers machined all over. This insures the same compression pressure in each cylinder and contributes materially to the smooth running qualities of the engine. Aluminum alloy, invar-strut type pistons are used, which permit of very small clearances between cylinders and pistons. The piston pins are of the full-floating type, held in place by a special snap ring construction.

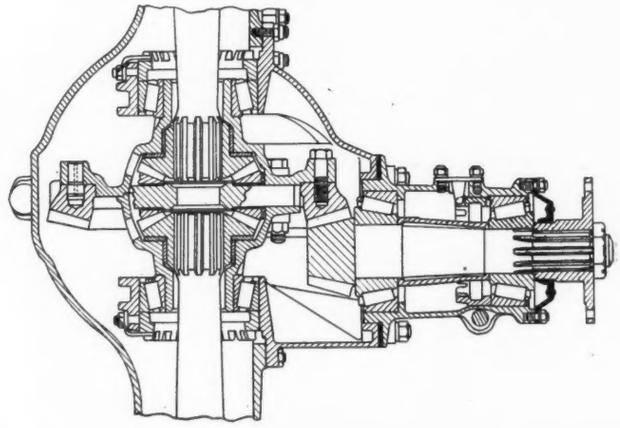
Chrome Nickel Steel Forgings

The connecting rods are drop forgings of chrome nickel steel, of the direct babbitted type, which assists in cooling the bearings. They are drilled from end to end to permit pressure lubrication to the piston pins.

The lubrication system has been worked out to provide pressure lubrication to all wearing parts, as far as possible. The oil pump is of the geared type, bolted to the lower surface of the crankcase upper section, and driven from the camshaft by helical gears and a vertical shaft. The arrangement of the crankcase lower section is such that the oil circulation is a direct reversal of



Front axle end, wheel and brake



Horizontal section through driving gear and differential

the customary practice. A large, fine meshed screen is used, and all the oil is drawn through this screen from the bottom to the top. As a result, the screen is almost self-cleaning, as any dirt or carbon caught by the under surface is free to drop off and fall into a trap in the bottom of the sump.

The pump draws oil from a compartment above the screen and delivers it to the camshaft rear bearing through a vertical drill hole in the crankcase. The camshaft is drilled throughout its length and acts as a manifold for oil distribution. Radial holes are drilled through the camshaft at each of the seven bearings, and oil is led direct from these holes to each of the crankshaft main bearings. Thus all camshaft and crankshaft main bearings are at all times under full oil pressure, as are the crank pin bearings, which receive the oil through drilled holes in the crankshaft.

Cylinder Lubrication

As the joint between the connecting rod and cap a passage of triangular section meters oil throwoff to the cylinder bores during 46 deg. of revolution. A 46-deg. radial groove, communicating with the triangular passage, is so located that oil is discharged only when it can find its way into the cylinder bores.

The oiling of the automatic idler for the front end timing chain, and for the bearings of the shaft for the auxiliary drives, is taken care of by oil under pressure taken through drilled holes in the crankcase from the camshaft front bearing. The air compressor, which is directly driven and integrally mounted on the engine, is lubricated by oil under pressure through a feed from the front end of the engine crankshaft.

The lubrication of the valve gear is provided for by a passage through one of the hold-down studs, which conducts oil from the camshaft proper, during a portion of the revolution, through special studs to the hollow cam follower shaft, which is at all times filled with oil. Oil is also led to the valve rocker shaft through a specially drilled stud and bracket which holds this shaft, and, as the top of the stud is higher than any part of the overhead valve gear requiring lubrication, the valve mechanism is lubricated under a gravity head of oil.

Drilled holes in the valve rocker shaft communicate with grooves and holes in each valve rocker, oil being led through one end to the valve, and through the other to the push rod end. This system provides for the valve thrust cups previously mentioned being adequately lubricated, and also the ball surface of the adjusting screw in the other end of the rocker arm.

The cams and cam followers are located in a direct line with the oil throwoff from the ends of the crank pin bearings. The oil pressure is adjusted by means of a screw. An automatic "blowoff" valve takes care of high pressure in cold weather, etc. The oil passages are indicated on the cross sectional views of the engine.

The induction system is of the six-port type, the manifold having a heated riser above the carburetor and down-grade branches. An air cleaner of the wire gauze type, dipped in oil, is provided.

The exhaust system is of the ejector type, the exhaust manifold having two outlets at the center, with a double connection through a cross-over passage through the cylinder head to the heated riser above the carburetor. The amount of exhaust gas passing through the carburetor riser is controlled by a valve.

An automatically tensioned, toothed chain is used for the front end drives. The auxiliary driveshaft is located on the right side of the engine, and the water pump, generator and ignition unit are driven from this shaft in single file, in the order named.

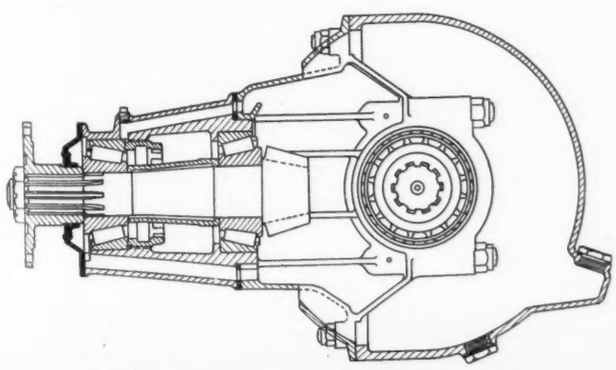
A battery ignition system is used, with two spark plugs per cylinder, and the spark advance is a combination manual and automatic. The arrangement of the ignition system is such that at the time of ignition each cylinder is electrically synchronized, but at the same time the arrangement provides that the failure of one plug does not put the other plug in the same cylinder out of action.

Water circulation is by a large capacity centrifugal pump having its bearings lubricated by circulating water from the pressure side of the pump. Distribution of cooling water throughout the length of the cylinder block and head is obtained primarily through drilled holes on both sides of each spark plug, so that the spark plugs are adequately cooled. Cooling water is automatically distributed in equal quantities throughout the entire length of the cylinder block and head by slightly restricting the ports between them. A thermostat in the water outlet from the cylinder head is set to maintain a temperature of 160 deg. Fahr. at that point.

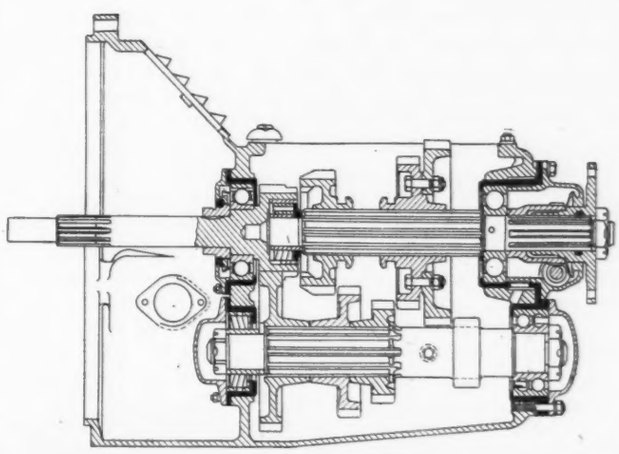
Two-Plate Dry Clutch

The clutch is of the two-plate dry type, with forced circulation of air to cool the friction surfaces. The three pressure plates, two with through cored passages for lightness and cool running, are of cast iron, and the friction material on the two steel clutch disk is of the moulded type, these latter disks being slotted radially to prevent undue distortion under heat.

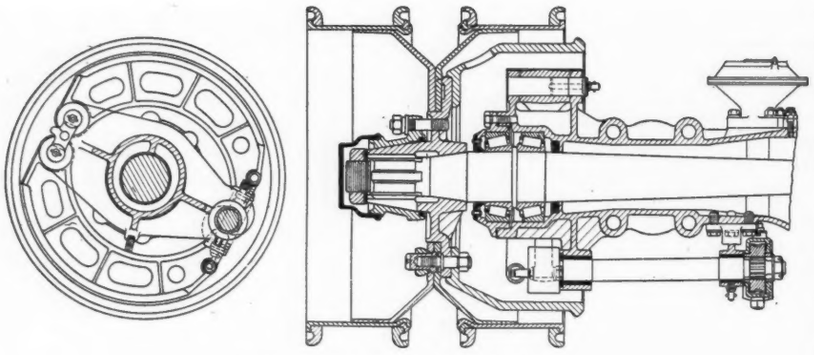
The release mechanism is of the three-lever type, with a grapho-carbon throw-out bearing working



Vertical section through rear axle center



Four-speed transmission



Rear axle end, wheel and brake

against a cast-iron throw-out sleeve. Progressive engagement is insured by the interposition of nine springs between the flywheel and the front pressure plate. The clutch cover is cast with a recess for the 12 main pressure springs.

The transmission, which is mounted as a unit with the engine, is of the four-speed sliding gear type with all except the reverse gears ground on the teeth. Deep grooved annular ball bearings are used to mount the main shafts, with the exception of the front end of the countershaft and the direct driveshaft pilot bearings, at which points Hyatt roller bearings are used. The transmission case is of aluminum, with steel sleeves bolted into the case to carry the shaft bearings. Ten-spline shafts are used for both the main and the countershaft. A special taper-headed wedge bolt passing through the slotted end of the reverse idler pin is used to expand the end of the pin in the transmission case boss, thus insuring a definitely tight fit. The gear ratios are as follows:

First Speed	5.05 to 1
Second Speed	2.68 to 1
Third Speed	1.64 to 1
Fourth Speed	1.00 to 1
Reverse	6.38 to 1

The speedometer drive gears are incorporated in the extension of the main shaft rear bearing housing, and automatically lubricated from the transmission.

The rear axle is of the semi-floating type with single reduction, spiral bevel driving gears. The axle housing is a one-piece, heat-treated steel casting with a carrier type differential and driving gear assembly. The pinion is of the overhung type, carried on taper roller bearings. Taper roller bearings are used throughout, with two bearings back to back on each side for carrying wheel loads. Adjustments of the bevel driving gear and pinion can be carried out as a bench assembly.

A novel form of construction for attaching the rear wheel hubs to the spindles is shown in the drawings.

The inner end of the hub bore fits on a taper on the axle shaft, and the outer end of the bore is splined to fit splines on the shaft. The outside diameter of the outer end of the hub is tapered and is slotted along the center line between the splines. A taper sleeve is fitted at this point and drawn up tightly on the hub taper by four studs on the hub flange. This construction insures a positive fit of the hub on the axle shaft, and at the same time is easily removable when necessary.

The front axle is of the inverted Elliott type, the center being a drop forged I-beam, heavily reinforced outside the spring pads to take care of the torsional loading of the front wheel brakes. The large end of the tapered king pin is at the bottom while the weight of the vehicle is carried at the top, so that the tendency at all times is to pull the king pin more tightly into the axle. The vehicle weight loads in the steering knuckles are taken care of by special taper roller bearings with radially disposed rolls. In the front elevation the king pins are inclined, although true center point steering is not used.

Four-wheel brakes are used and are operated by the Westinghouse compressed air system. As previously noted in the description of the engine, the air compressor forms an integral part of the engine and is driven directly from the front end of the crankshaft. The brakes are of the expanding, metal-to-metal type, with high-carbon drums and low-carbon shoes. No liners are used, the shoes being of the "throw-away" type. Only a small degree of self-energization is used, and the brakes are operated with a pressure of 75 lb. p. sq. in. in the storage tank. The widths of the front and rear brake shoes are 2 in. and 5 in. respectively.

The principles of the Westinghouse braking system used on this motor coach have been previously successfully applied to an earlier model, and this construction represents the latest development. One point which has been clearly demonstrated is the absence of excessive tire heat under continuous high-speed braking, and this is directly attributed to the metal-to-metal brake combination used on all four wheels.

The emergency brake consists of a single drum mounted on the flange at the rear end of the front universal joint shaft adjacent to the frame cross-member carrying the intermediate bearing for the shaft. The brake is of the contracting band type and is operated by a lever mounted outside the frame. The frame cross-member takes the brake reactions directly, and the brake drum is so mounted that it can be removed as a unit with the front driveshaft.

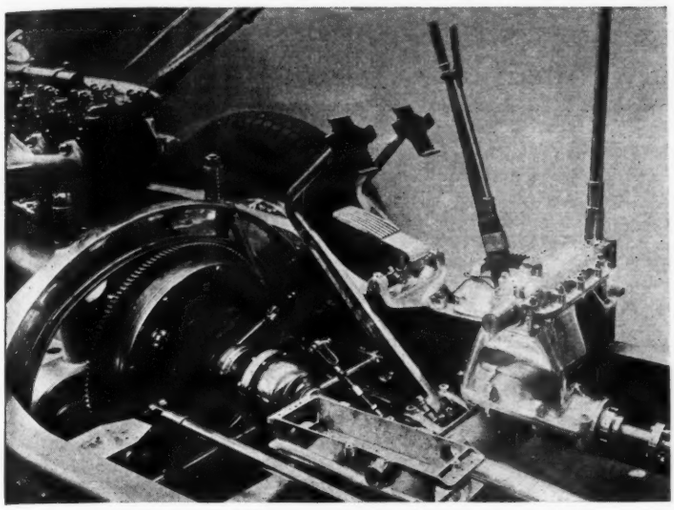
The frame, which is of heat treated carbon steel, has a normal channel cross section 10 by 3½ by 7/32 in., with a kickup at front and rear. The depth of 10 in. is considerably increased at the point where the front kickup commences, and in addition, fish plating is carried out from a point forward of the rear front spring hanger to well behind the main cross member, which is located at the back of the transmission. Plates are fitted at all main supporting parts, and at the point of the steering gear attachment. In addition large diameter tubular cross-members, together with deep section channel cross-members, form a rigid frome assembly.

The rear springs are of the progressive type, with four auxiliary leaves, and the front springs are fitted with special rebound plates, these being installed with initial tension. The spring shackles used are of special design, provided with means for adjustment to take care of side play, with a positive clamping attachment.

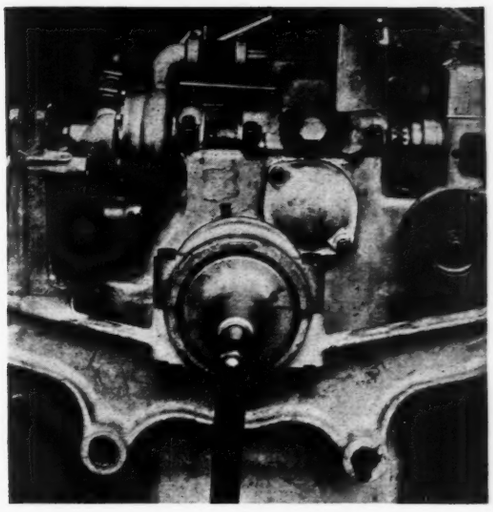
The gasoline tank is mounted along the right hand side of the frame, approximately midway, and is carried in a special cradle which permits of ready removal when the body is in position. The tank capacity is approximately 40 gal., and the gasoline is delivered to the engine by means of a triple unit electric pump.

The steering gear is of the cam and lever type, mounted directly on the outside of the frame and braced to the dash. It has a reduction ratio of 23 to 1. All steering connections are of a special semi-ball type, fully housed to prevent the entrance of dirt or water, and to retain lubricant.

The standard wheelbase is 227 in.



Rear engine bearer of aluminum with spring-cushioned supports



Front engine bearer of aluminum with fabric-bushed trunnion

"Aluminum Bus" *Designed by* Pomeroy *for* Associated Daimler Co.

Chassis weight reduced to 6050 lb. by use of aluminum for front and rear engine bearers, spring brackets, steering gear housing, spring shackle links, the crankcase, etc.

ALUMINUM is used to a notable extent in a new bus chassis designed by L. H. Pomeroy for the Associated Daimler Co., England, the makers of 90 per cent of London's buses and of the A.D.C trucks. It is used, for instance, for the spring brackets, spring shackle links, steering gear housing, dashboard, brake drums and shoes, disk wheels and, most notable of all, for the front and rear engine bearers; also for the crankcase, gearset and worm gear carrier.

The engine, a six-cylinder sleeve valve type, with steel sleeves, is suspended at a single point in front by means of a fabric bushed trunnion carried by the aluminum front cross-member of the frame, below the aluminum-cased radiator. At the rear, the aluminum crankcase is suspended from an aluminum bridge member of H section through the agency of two bolts with square-section helical springs under their nuts.

Engine bore and stroke are 81.5 x 114 mm. (approximately 218 cu. in.). With the driver behind the engine a 30-seated single-deck bus body is provided for, while a 39-passenger body is intended for the driver-beside-engine type.

With a wheelbase of 207 in., the track is 70 in. at the front and 67 in. at the rear. The unloaded chassis height at the center is 27½ in., the frame having a kick-up above the rear axle and an upsweep at the front.

A plate clutch, separate four-speed gearset, two-part open propeller shaft and under worm drive of 8.25 to 1 ratio comprise the transmission, the gearset being three-point suspended, while a contracting shoe type transmission brake (hand operated) occurs at the front end of the rear section of the propeller shaft. Four-wheel brakes are fitted, pedal operated through a vacuum servo.

Engine lubrication is by pressure throughout, a Skinner oil rectifier being provided that draws excess oil from the valve sleeves and pistons. An AC by-pass filter is fitted and an oil primer is coupled to the carburetor strangler control. Fuel feed to the Solex carburetor is by duplex Auto-pulse pumps, while battery ignition has been adopted, with dual coils and automatic timing control. Water circulation is by pump, a thermostat being embodied, and the gilled tube radiators have detachable top and bottom tanks of aluminum.

Steering is by Marles cam gear; the front axle is H-section between the springs and elliptical outside; taper roller bearings are used for the hubs, front and rear, and also for the differential and worm shafts. The rear axle is an inverted pot casting, with the worm gear and differential in an aluminum carrier that can be lowered when the axle shafts are withdrawn. Aluminum tapered disk wheels are fitted, fixed by 10 studs and having 38 x 8¼ in. low-pressure tires.

The wheel brake drums and shoes are of aluminum, the former lined with cast-iron. The rear shoes are of 16 in. diameter and 5 in. wide, the front ones being 2¾ in. wide. Brake operation is effected through steel ribbons and the braking effort is distributed to the four wheels from the center of tubular cross shafts to equalize the shoe pressure. Half-elliptic springs are used with aluminum brackets, the rear ones being underslung; four rebound plates and Houdaille hydraulic shock absorbers are provided for the front springs. The weight of the chassis is 6050 lb.

AUTOMOTIVE NEWS SECTION INDUSTRIES
Philadelphia, Pennsylvania
December, 10, 1927

Ford Display Clears Way for Increased Retail Sales

PHILADELPHIA, Dec. 10—Although the Ford announcement has relieved widespread uncertainty in the automobile industry concerning the price of the new car, it is too soon to report the approximate effect on the market. Many dealers believe that it will be easier to sell cars now that the new Ford is an actuality rather than a phantom.

The current low state of production and sales can be judged from the preliminary figures on November business. Output last month was 24 per cent under the same month of 1926 for the companies exclusive of Ford and for the entire industry marked a drop of about 50 per cent. It is likely, however, that the December results will compare more favorably with last year, when there was a sharp year-end decline.

Marketing and production plans can now be pursued more confidently, with all details of the Ford situation thoroughly known. The fact that Ford dealers for some months to come will be hampered by inability to give prompt deliveries is being given due consideration, as the Ford company has made no secret of the fact that peak production of the line is several months off.

Ajax and McClaren Merger Under Way

CHARLOTTE, N. C., Dec. 7—Directors of the McClaren Rubber Co. will vote Dec. 14 on a proposal to merge that company with Ajax Tire & Rubber Co. Ajax directors will take action Dec. 20 on the proposal which was worked out here at the instance of the Ajax company, according to H. L. McClaren, president of the McClaren company. The merger plan provides that Mr. McClaren will become president and general manager of Ajax and will remove his headquarters to either New York or Racine.

Schneider Sales Manager

NEW YORK, Dec. 7—Harrison Radiator Corp., Lockport, N. Y., has appointed Louis J. Schneider sales manager. With this appointment, Mr. Schneider resumes a connection with that company after eight years' sales experience with the Clark Equipment Co., the C. G. Spring Co. and the Oakes Co. Sales offices have been opened in the General Motors Building, Detroit, these offices being shared by L. P. Saunders, experimental engineer of the company.

Rim Production Falls 4,215,550

CLEVELAND, Dec. 7—Manufacture of rims for the 11 months of 1927 has fallen 4,215,550 below the total for the 11 months of 1926, the November report of the Tire & Rim Association of America, Inc., shows. Eighteen-inch balloon production increased from 37,486 in November, last year, to 46,054 in November, this year, and 20-in. balloons went up from 152,220 to 173,926. Production of 20-in. truck rims increased from 90,692 to 129,812. All other sizes show decreases. Twenty-one inch balloons decreased from 731,822 to 213,296.

Comparison of November production in leading sizes follows:

	1927	1926
Clinchers		
30 x 3½	78,605	112,990
19" Balloon		
26 x 3½	34,086	2,582
27 x 4	64,977	11,106
28 x 4½	35,359	132
20" Balloon		
27 x 3½	25,468	217
28 x 4	68,455	120,500
29 x 4½	28,660	24,237
30 x 5	36,398	7,266
21" Balloon		
28 x 3½	44,809	518,370
29 x 4	95,178	131,337
30 x 4½	52,380	66,330
High Pressure		
32 x 4½	16,374	22,709
20" Truck		
30 x 5	92,774	73,819
32 x 6	28,955	15,075

Hupp Sets Month Mark

DETROIT, Dec. 5—Hupp Motor Car Corp. shipped 5076 cars in November, the largest month in the company's history. The previous high mark was in June, 1926, when 5041 cars were shipped. Shipments in October were 2415.

Elcar Orders Engines

NEW YORK, Dec. 6—Elcar Motor Co. has placed orders with Lycoming Mfg. Co., a subsidiary of the Auburn Automobile Co., for all its engine requirements for 1928.

Colonel Ayres Sees 1928 Setting Record

CLEVELAND, Dec. 5—Forecasting business conditions in 1928 to the Chamber of Commerce here this week, Col. Leonard P. Ayres said more cars and trucks will be manufactured in 1928 than in any previous year. Falling off of about 750,000 in production this year from last he ascribed mainly to the shutting down of the Ford plants. The release of the new Ford cars is seen by Colonel Ayres releasing a large volume of deferred buying Ford and other cars.

N. Y. Air Shows Large Carbon Monoxide Content

NEW YORK, Dec. 7—Carbon monoxide gas from automobile exhausts is polluting the air here to the extent of 24 to 284 parts per 1,000,000 parts of air. This was revealed in an announcement by City Health Commissioner Harris of recent tests taken in cooperation with the United States Public Health Service.

Commenting on the analysis, Dr. Harris said the large quantities of carbon monoxide endanger health, particularly the health of those susceptible to carbon monoxide who are constantly subjected to it. With the constantly growing use of motor vehicles it is important to have these air tests, Dr. Harris said, to assist physicians and the public to understand symptoms that otherwise would be unexplainable.

Stearns Promotes Lawson

CLEVELAND, Dec. 8—O. T. Lawson has been appointed vice-president of the F. B. Stearns Co. and has been elected to the board of directors. Mr. Lawson is production manager of the company and has been with the organization for the past two years. He has been identified with the industry for 13 years, serving with Bendix Brake Co., Tripensee Enclosed Body Co. and the Stephens Motor Car Co.

Paige Sales Increase 18%

DETROIT, Dec. 5—Sales by Paige-Detroit Motor Car Co., in November, were 18 per cent larger than any previous November, according to R. C. Graham, vice-president. October sales were likewise exceeded. A continuance of active demand is expected.

Mack Trucks Offers 4-Wheel Brake Line

New AK Model is Priced at $4,700 and $4,850—Has Three Wheelbases

NEW YORK, Dec. 7—Mack Trucks, Inc., has developed a new high speed heavy duty truck claimed to produce 25 per cent more power at a given speed than the former AC model. The new model, which will be designated the AK, has a capacity of 3½ tons and wheelbases of 162 in., 174 in. and 186 in. This truck is powered by a new four-cylinder engine of the block type with detachable aluminum heads, having 4⅝-in. bore and 6-in. stroke.

Among new features on the AK model are a shorter turning circle than was formerly available in the Mack trucks, a side opening to the transmission which permits easy accessibility without the removal of floor boards, rubber shock insulation in the cab and seat, and a fuel tank filler opening in the right side of the cab.

The new truck has four-wheel brakes, the foot brakes being of the enclosed expanding type with vacuum booster attachment and the hand brake being operated mechanically and of the external contracting type.

A 40-gal. gasoline tank is mounted under the driver's seat. The truck can be obtained with either the Mack dual reduction drive or the standard Mack chain drive. The former is priced at $4,850 and the latter at $4,700.

German Manufacturers Reduce Prices 5 to 10%

NEW YORK, Dec. 8—Downward revisions of prices are the order of the day in Germany, partly a result of the modernization of factory equipment which has led to a reduction in the cost of production, and partly because of the gradual reduction in German tariff duties which are lowered every six months and the consequent increase in foreign competition. During the months of September and October price reductions ranging from 5 to 10 per cent were announced by Mannesmann, Faun, N.A.G.-Protos, Simpson Supra and Opel in the passenger car field, and by Krupp, Dixi and M.A.N. in the truck field.

Soviet Builds Factory for Automobile Assembly

NEW YORK, Dec. 8—Definite steps toward the creation of an automobile industry in Russia have been taken by the Soviet government. A large manufacturing plant is being erected in Russia by foreign construction firms with the assistance of Russian engineers. A sum of $1,500,000 was appropriated this year for the purchase of raw materials, trips to foreign countries, design, etc. It is planned to spend a total of $35,000,000 on the works, which are to be completed in four years and at the start will be devoted only to the assembling of cars from imported parts. Complete manufacture of cars is to begin in 1933. The capacity of the plant is estimated at 10,000 cars and trucks annually.

Bus Regulation Need Growing, Says I.C.C.

WASHINGTON, Dec. 8—A brief summary of the work done by the Interstate Commerce Commission in connection with its motor bus and motor truck investigation, under docket No. 18300, is contained in the annual report of the department made to Congress today. The commission's report on this phase of its work follows:

"During the past year laws were enacted in four states providing for the regulation of motor vehicles, so that there is now some form of regulation or control over common-carrier motor vehicles in 42 states and the District of Columbia. The rapidly increasing use of motor buses and motor trucks makes the absence of any regulatory control over those engaged in interstate commerce a problem of constantly increasing importance.

"Statistical summaries of the answers of the respondent railroads to questionnaires have been tabulated and made available to the public.

"We deem it advisable that a proposed report be prepared by an examiner and served upon the parties to the proceeding, thus affording opportunity for the filing of exceptions thereto, to be followed by oral argument before us and report thereon to the Congress with our recommendations as speedily as may be consistent with the nature and importance of the subject."

Railway Association to Form Motor Transport

NEW YORK, Dec. 6—Permanent organization of a motor transport division by the American Railway Association will be effected at a meeting in Chicago in January. Pending final organization, the division has taken over the Motor Vehicle Conference organized a year ago by A. R. Russell, vice-president of the New York, New Haven & Hartford Railroad. Mr. Russell is temporary chairman of the division.

Stutz Convention Dec. 12

INDIANAPOLIS, Dec. 6—Stutz Motor Car Co. of America, Inc., will hold its annual sales and service convention at the factory Dec. 12 to 14. More extensive use of Weymann bodies in 1928 is planned and the company will announce plans for sale of the Pak-Age-Car. Charles M. Schwab, a director, will be the principal speaker at a dinner Dec. 12. About 500 sales representatives will attend.

Business in Brief

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co.*

NEW YORK, Dec. 8—Considerable encouragement has been given to business by the introduction of the new Ford car last week. Stock prices have been buoyant while the volume of brokers' security loans has again risen to a new peak. Sales of goods at both wholesale and retail continue to be impeded by adverse weather. New financing last month totaled approximately $725,000,000, which is nearly $175,000,000 below the record volume in October.

FREIGHT CAR LOADINGS

Railroad freight car loadings in the week ended Nov. 19 again were lower, numbering 968,103, as compared with 974,862 in the previous week and 1,071,707 in the corresponding period a year ago. Total loadings so far this year amount to 47,441,242 cars, as against 48,412,144 cars in the same period last year and 46,600,612 cars two years ago.

PETROLEUM PRODUCTION

Production of crude petroleum rose during the week ended Nov. 26, average daily output for that period being 2,498,350 bbl., which compares with 2,466,950 bbl. a week earlier and 2,391,350 bbl. in the corresponding period last year.

FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices declined to 145.7 last week, as against 146.1 in the previous week and 145.2 four weeks earlier.

BANK DEBITS

Bank debits to individual accounts, as reported to the Federal Reserve Board for the week ended Nov. 30, were 15.1 per cent below the total of the preceding week and 8.9 per cent greater than the amount reported in the corresponding period of 1926.

FEDERAL RESERVE REPORT

For the same period the Federal Reserve banks reported that discounts rose $58,700,000 and open market purchases $28,000,000. Reserves declined $52,700,000, U. S. Government securities $73,400,000, note circulation $12,100,000 and deposits $22,600,000. Member banks reported that loans and discounts increased $83,571,000, investments $16,319,000, net demand deposits $226,668,000 and borrowings from the Federal Reserve banks $56,444,000.

Time money and commercial paper rates were higher last week at 4 to 4¼ per cent and 3¾ to 4¼ per cent, respectively.

Leavitt State Distributor

TOLEDO, Dec. 5—Willys-Overland Co. reports that J. W. Leavitt & Co. has been appointed distributor of Willys-Overland cars for the entire state of California. Mr. Leavitt is credited with being the originator of the instalment sales plan.

Ford to Manufacture in Dallas Branch

Preparations Under Way to Widen Branch Operations —Seeks Lower Costs

DALLAS, TEX., Dec. 3—The Ford branch factory here will be turned into a manufacturing plant instead of an assembling plant in January, according to A. J. Langford, manager, who has just returned from Detroit. Equipment for converting the Dallas plant into a factory for production is being shipped steadily. Much of it has already arrived and the plant will be in full operation as a Ford factory early next year. At that time the plant will employ about 2000 men.

Under the new plan the raw material will be shipped here and many of the parts of the cars manufactured in the plant. The assembling of the cars will be, in a large measure, from manufactured parts in the local plant.

It was said the new scheme is to be tried out in few of the strategically located points and that it is expected to reduce the cost of the cars and facilitate distribution. The plan for the Dallas factory is to manufacture most of the parts and assemble the cars for the trade in this district. Bodies are said to be part of the work which will be done in the local plant.

Mr. Langford studied the making of parts and the assembling of the cars while in Detroit. Some of the experts from the factory are expected to be with the local branch when it begins its operations.

Parts Plants Increase Output

SPRINGFIELD, MASS., Dec. 5—Moore Drop Forging Co. is increasing its plant equipment and making other preparations for quantity production of forgings for various small parts of the new Ford model, and it is anticipated that the old system of day and night shifts at this plant soon will be restored.

American Bosch Magneto Corp. is now in limited production on timers for the new Ford car, and the number of timers produced here will be equivalent to the total number of the new model manufactured by the Ford company, according to Morris Metcalf, treasurer of American Bosch. Increased production by the automotive division is expected to offset the seasonal decline in radio production.

Many Accessories Available

DETROIT, Dec. 3—The following accessories used on many cars are not included in original equipment on the new Ford car: Radiator shutters, thermostat, spot light, air cleaner, oil filter, tire gage, spare tire and tube, spare tire cover, lacquer polish, trunk rack, trunk, spare tire lock, heat indicator, car heater, cigar lighter, parking light, vanity set, smoking set, windshield wings, clock, step plates, trouble light, window eaves and ventilators, automatic windshield wipers on open cars and dash oil gage, either level or pressure type, seat covers, sun visors on open cars, glass enclosures for open cars, tilting steering wheel and an adjustable steering column bracket, fancy radiator ornaments, fancy gear shift lever balls, tire chains, rubber pedal pads, spring lubricators, robe rails, running board luggage carrier, foot rests, robes, rumble seat windshield, backing up switch for stop light, ball bearing shackles, fire extinguishers and window curtains.

Model T Drivers Must Requalify

BOSTON, Dec. 3—One new angle regarding the Ford announcement in Massachusetts was brought out by Registrar of Motor Vehicles Frank A. Goodwin yesterday. He stated that all those drivers in the Bay State who now operate Ford cars under the special license given for planetary transmission machines will have to take a test before they can operate the new models.

Ford Hamilton Factory Plans 30,000 Wheels Daily

HAMILTON, OHIO, Dec. 5—Eventual production of 30,000 wire wheels daily at the Hamilton plant of Ford Motor Co., is predicted by O. A. Anderson, general manager of the plant. Mr. Anderson predicted that the plant would be running to full capacity soon after the first of the year. New machinery costing $750,000 has been installed.

Production now on wire wheels is around 900 wheels daily. That number will be gradually increased to a point where 15,000 front wheels are made. When that is reached the work of making the rear wheels, which will be made at the Highland Park plant in the meantime, will be taken over and the output gradually increased to the maximum of 30,000 daily. This will mean the employment of 3500 men. Ordinarily the plant employed 2500 men.

The plant will also start production soon on parts for the new Ford.

Mr. Anderson announces that about 1200 wood wheels daily for replacement on the Model T will also be made at the plant.

Ford Insurance Rates Revised

NEW YORK, Dec. 5—Theft insurance rates on the new Ford will be reduced 38 per cent on account of the decreased hazard, although there is an increase of about 20 per cent in the fire insurance rates. The cut in the theft rates is due to mechanical locking device on the new car.

Ford Steel Buying Brings Competition

Full Finished Body Stock Market Uneasy — Other Metal Prices Steady

NEW YORK, Dec. 8—Cross-currents abound in the steel market. While efforts are being made in some quarters to advance sheet prices, a West Virginia "independent" having taken the lead in announcing higher prices, the keenest of keen competition has developed among producers of full-finished body stock which is none too firm at 4 cents, Pittsburgh.

The steel market has figured out that, when Ford production reaches the contemplated maximum of 10,000 cars a day, it will add just about 7 per cent to the present rate of steel consumption, figured in terms of theoretical ingots. The four 100-ton basic open-hearth furnaces that constitute the Ford steel plant, have a capacity of 1200 tons a day, about 1 per cent of the prevailing rate of steel production of 127,500 tons per day. The Ford steel production takes the form of bars for forgings.

It will be in the sheet market that Ford requirements will make their weight felt principally, the recession of full-finished sheets to the 4-cent level being interpreted by the trade in connection with the first representative commitments in the sheet market by body builders with Ford orders. Periodically this Ford buying will "smoke out" the sheet market, and it will be none too easy a job for rollers and finishers to obtain better prices from other consumers.

Pig Iron—Middle West automotive foundries are making no haste to enter the market on a larger scale, most of them having considerable tonnages due them on old contracts. While the Valley market on foundry is 25 cents lower, Michigan and Ohio quotations remain nominally unchanged. Ferromanganese, next to pig and scrap the most essential steel-making material, has been advanced $10 per ton by domestic producers and importers.

Aluminum—The market is devoid of price changes. European advices state that the American producer has started a new plant in Norway, adding further to the world's supply.

Copper—With copper having advanced to 14 cents, prices for all copper, brass and bronze products have been revised upward.

Tin—The market is steady. Higher export prices for American copper may before very long make for higher prices for British tin.

Lead—Following several advances, the market now rules firm. Storage battery buyers bought moderately following the first advance.

Zinc—Consumers as well as producers assume a waiting attitude. The market rules steady and quiet.

Federal Aid Roads Total 64,209 Miles

Report to Congress Shows Mile of Highway for Each 118 Automobiles

WASHINGTON, Dec. 10—A total of 8306.9 miles of Federal-aid highways was added to the nation's highway system during the fiscal year ending June 30, at a cost of $182,770,089, of which the Federal government paid $81,330,357, or 44.5 per cent, according to annual report made this week by the U. S. Bureau of Public Roads to Congress. Under the Federal aid program inaugurated in 1916, the total miles constructed to date are 64,209 miles. When fully completed the Federal aid program provides for a total highway system of 185,772 miles.

Some interesting figures are contained in the report, showing that were the 21,889,896 automobiles registered during 1926, evenly distributed over the highway system, there would be 118 automobiles on each mile of the road. In the Middle Atlantic States there would be 363 cars per mile, in New England 233 cars, in the Pacific States 209, East North Central States 193, East South Central 69, South Atlantic 96, Mountain States 34, West South Central States 81, and West North Central 66.

The cost of construction, to the Federal government is highest in the Middle Atlantic States, being $7,566 per mile, and lowest in the West North Central, being $2,719 per mile, and for all states an average of $4,000 per mile.

The gross income from motor vehicles in license and gasoline fees was $474,304,078, the average gasoline tax being 2.55 per gallon. Pennsylvania motorists paid the most, paying $35,827,000, and New York was second paying in license fees, $28,786,000. The total cost, under the Federal aid program, of the 64,209 miles, has been $1,234,173,187 of which the Federal government paid $544,884,911.

Coolidge Approves Road to Join Two Americas

WASHINGTON, Dec. 5—A resolution, providing for American cooperation with the governments of Central and South America in the construction of a highway connecting the two countries with the United States, will be introduced next week in Congress by Rep. Watson, of Pennsylvania, who has discussed the proposed plan with President Coolidge.

After his conference at the White House, Mr. Watson said the President evinced much interest in the proposal and indicated that he would endorse the idea in his annual message to Congress next Tuesday. Mr. Watson has just returned from a three months' tour of these countries.

Mexico Has One Car to 286 Inhabitants

WASHINGTON, Dec. 3—Mexico's population, according to census figures just furnished the U. S. Department of Commerce by its representative in Mexico City, is 14,334,780. The figures cover the census year of 1921, which have just been completed by the government. It shows 7,003,785 men and 7,330,995 women. A census of automobiles in Mexico, announced earlier last week, showed that the total for the entire country was approximately 50,000, or one automobile for each 286 inhabitants. The 1921 census of persons is the latest.

Secondary Highway Improvement Urged

WASHINGTON, Dec. 5—The immediate improvement of the 2,500,000 miles of secondary highways through the United States, with progressive type roads designed to handle traffic needs in all parts of the United States was one of the principal recommendations made by the Highway Research Board which held its seventh annual meeting here this week. These roads may be improved to handle the local traffic efficiently and economically at prices ranging from $2,000 to $10,000 per mile it was declared.

The meetings were presided over by Charles M. Upham, chairman of the board and managing director of the American Road Builders' Association. One of the principal speakers was A. J. Brosseau, president of Mack Truck, Inc., speaking on the subject of highway finance.

"The American public has today a total investment in rural highways, conservatively estimated to be well in excess of $10,000,000,000," he said. "The rolling stock in use on these roads represents an investment of at least as large a sum. The highways are financed by state and local agencies, with the motoring public paying about 50 per cent of the total."

Eno Elected Chairman

Other speakers, of prominence, included C. F. Kettering, head of General Motors Research Corp. At the meeting of the executive committee, Prof. Frank H. Eno of Ohio State University, was elected chairman for the coming year. Other members will be Roy D. Chapin, president of the National Automobile Chamber of Commerce; T. R. Agg; Charles M. Upham; T. C. Dickinson, U. S. Bureau of Standards; T. H. H. MacDonald and William Spraragen of the Research Council.

Exports in October 12.5% of Production

Increase Over 1926 Total Shows Conditions Sound —Truck Ratios High

WASHINGTON, Dec. 10—Exports of automobiles and trucks from the United States during October, according to revised figures just announced by the U. S. Department of Commerce, totaled 27,718, of which 19,366 were passenger cars and 8352 were trucks. Exports in October last year were 20,473 units. The ratio of exports to production during the month shows that an average of 12.5 per cent of all motor vehicles were exported. Truck exports were 23.5 per cent of the production in October and passenger car exports were 10.4 per cent. October production was 185,706 cars and 35,586 trucks.

Revised figures for the first 10 months of this year, show that production was 3,072,915, of which 329,185 units were exported, or an average of 10.7 per cent. For the January-October period the passenger car production was 2,694,570 of which 8.9 per cent, or 240,875 passenger cars were exported. Truck production was 378,345, of which 23.3 per cent, or 88,312 trucks were exported.

The value of the January-October exports was $346,260,883, compared with $337,507,000 exported the same period last year. The October exports were valued at $29,434,925—an increase in value of 24.6 per cent over the corresponding month of 1926. The monthly average exports this year have been $34,626,069. The average value of passenger car exports in October was $776 per unit, and of trucks, $712 per unit.

Oakland Plans Output of 270,000 Cars in 1928

DETROIT, Dec. 5—Testifying before Commissioner H. C. Davis of the Interstate Commerce Commission on the necessity of the Pere Marquette railroad being allowed to enter the city of Pontiac, A. R. Glancy, president and general manager of the Oakland Motor Car Co., said that the Oakland Motor Car Co. built 191,000 motor cars, this year, and plans to construct 270,000 automobiles in 1928.

Other prominent men in the automotive industry testifying in behalf of a second railroad for Pontiac were: Louis Ruthenberg, vice-president and assistant general manager of the Yellow Truck & Coach Mfg. Co., and D. R. Wilson, vice-president and general manager of the Wilson Foundry & Machine Co.

Efforts of the Pere Marquette to enter Pontiac are being fought by the Grand Trunk Railway, which, at the present time offers the only rail facilities.

Men of the Industry and What They Are Doing

Nash Declares Service Surest Way to Business

Speaking to service and parts managers, gathered in Kenosha for their fifth annual meeting, C. W. Nash, president of Nash Motors Co., said too little attention is given the customer after he had once paid out good money for a car. A situation such as that is fundamentally wrong, for the owner, entirely satisfied with his car and entirely satisfied with the service rendered him by the dealer, will tell his friends and that, in my opinion, is the surest avenue to increased business.

Among others who addressed the service men at the various gatherings held during the convention were J. T. Wilson and M. H. Pettit, vice-presidents; L. L. Virgil, service manager; Harold Seaman, president of the Seaman Body Corp.; D. M. Averill, manager of the Nash Racine plant; Earl Gunn, engineer at the Nash Racine plant; James Auten, manager of the Nash Milwaukee plant; Mead Moore, engineer of the Nash Milwaukee plant; N. E. Wahlberg, chief engineer of the Nash Motors Co.; P. J. Moohan, works manager, Kenosha plant; R. J. Bentz, E. H. Mahoney, W. S. Nathan, P. G. Little, E. R. Lorenz, E. E. Miller, R. S. Craig of Los Angeles, Frank Clark of Oklahoma City, R. E. Sproat, H. R. Neal of Cleveland, W. G. Stroud, Indianapolis; L. G. Brown, Baltimore, and W. M. Boomershine.

Marmon Names Managers

Stanley Zweibel and H. D. Brown have been appointed regional sales managers by Marmon Motor Car Co., Mr. Zweibel representing the company on the Pacific Coast with headquarters in San Francisco, and Mr. Brown in the Southeast with headquarters in Atlanta. Both men were previously divisional sales managers. Miles Smith and F. L. Gemmer, both of whom have been identified with Marmon for a long period, will be associated with Mr. Zweible and Mr. Brown, respectively.

Woods With Craveroiler

S. Dick Woods has been appointed engineer of the Craveroiler Co. of America. As an old timer in the racing game Dick Woods is well known in the industry. In his new work he will be closely associated with the sale and development of Craveroiler products in automotive centers.

Brosseau on Commission

A. J. Brosseau, president of Mack Trucks, Inc., has been named a member of the Business Men's Commission on Agriculture of the United States Chamber of Commerce, announced this week by L. E. Pierson, president of the Chamber.

Industry is Host to Contest Winners

Bethel Pugh of Pueblo, Col., 12-year old winner in the national highway educational safety contest, against 400,000 other students, and Elizabeth M. S. Laughton, of Boston, school teacher, winner of the teachers' essay contest, were this week brought to Washington, presented to the President and given appropriate recognition for their victories by the National Automobile Chamber of Commerce and the Highway Education Board, promotors of the safety campaign. The week of sightseeing and feteing in the nation's capital was concluded with a dinner in their honor at the Carlton Hotel, attended by high government and diplomatic officials and representatives of the automobile industry.

Chrysler Addresses Conference

A conference of regional managers, supervisors and district representatives of the Chrysler Corp. field sales organization was held in Detroit the week of Nov. 28-Dec. 3. An extensive program of meetings included a series of private and general conferences, with addresses by many Chrysler executives. J. E. Fields, vice-president in charge of sales, presided at a turkey dinner in the Detroit-Leland ballroom, at which Walter P. Chrysler, president and chairman of the board, reviewed the company's progress during the past year and outlined plans for 1928.

Mooney Goes Abroad

J. D. Mooney, president of General Motors Export Co., is returning to England on Dec. 14 where he will remain several months. C. R. Osborn, vice-president and general manager of the Overseas Service Corp., sailed Dec. 3 for London.

Jones Republic Director

R. W. Jones, of McBee, Jones & Co., New York, has been elected a director of Republic Motor Truck Corp., Alma, Mich.

Jenkins Joins Shuler

R. C. Jenkins, formerly field service man for the Sheldon Axle & Spring Co., has joined the Shuler Axle Co., Louisville, Ky., as special representative.

N.A.C.C. Adds Members to Traffic Committee

The personnel of the committee on street traffic of the National Automobile Chamber of Commerce has been revised as follows: Alvan Macauley of Packard Motor Car Co., and E. S. Jordan of Jordan Motor Car Co., remain on the committee and the following new members have been appointed: J. J. Raskob, General Motors Corp.; E. L. Cord, Auburn Automobile Co.; Robert P. Paige, Jr., Autocar Co., and A. T. Waterfall, Dodge Brothers, Inc.

W. E. Metzger, Federal Motor Truck Co., will act as chairman of a committee on uniform municipal traffic ordinances of the Hoover Conference to meet in Washington, March 8 to 10. Other representatives from the automotive field will be Alvan Macauley, Packard, and D. C. Fenner, Mack. Russell Huffman and John C. Long will also be present representing the N.A.C.C.

Autocar Makes Changes

Autocar Sales & Service Co. has transferred F. D. Wait from manager of the Brooklyn branch to manager of the New York and Bronx branches, succeeding F. B. Nostrand, deceased. G. G. Garland is moved from Richmond, Va., to Brooklyn, and L. C. Taylor is promoted from the sales force to the managership at Richmond. J. A. Morris, assistant general sales manager at the factory, has been made Chicago branch manager, succeeding S. M. Williams, who is on leave of absence because of poor health.

Scheuerle Sales Manager

Louis Scheuerle has been appointed sales manager of the Kellogg Mfg. Co., Rochester, N. Y., being promoted from district manager of New York and New England. H. F. Jones succeeds him in the New England territory and Charles A. Cole succeeds Mr. Jones in the Atlanta territory. C. A. Clark will be district manager of metropolitan New York.

Carlson Joins Trackson

W. G. Carlson, formerly advertising manager of the Gisholt Machine Co., Madison, Wis., has become associated in a similar capacity with the Trackson division of the Geo. H. Smith Steel Casting Co., Milwaukee, manufacturing crawler attachments for tractors.

Named to White Committee

Robert W. Woodruff, Atlanta, president of the Coca Cola Co., and W. C. Teagle, New York, president of the Standard Oil Co. of New Jersey, have been named members of the executive committee of White Motor Co., succeeding Windsor White and Thomas H. White.

President Supports Mellon Tax Report

Warns Against Reductions Which Might Cause Deficit —Urges Road Progress

WASHINGTON, Dec. 6—Support of the Mellon recommendations, which included the continuance of the 3 per cent excise tax on automobiles, was given by President Coolidge in his message to the Seventieth Congress today. He warned against a tax reduction which might result in a deficit in 1929 should slight business depressions occur. While welcoming information, he said, Congress should exercise its own judgment in making tax changes.

Under Department of Commerce management, he said, the national airways of the country have been increased to about 8000 miles and 4000 more miles are contemplated. By next July about 7400 miles of airway will have lighting and emergency landing fields. Daily airway flying is now nearly 15,000 miles and is expected to reach 25,000 miles early next year.

Pointing to the importance and benefit of good roads, the President said national participation should continue to be confined to trunk-line systems. He urged encouragement for more good roads to all principal points in countries south of the Rio Grande. Authority should be given by law, he said, to provide these countries at their request with engineering advisers for the construction of roads and bridges. He favored reasonable loans by private interests to open main lines of travel.

In connection with plans to commemorate the two hundredth anniversary of the birth of George Washington, he said Congress may well consider the proposal to build a memorial road from Washington to Mt. Vernon.

Underwriters Name Officers

NEW YORK, Dec. 3—The National Automobile Underwriters Conference, at its annual meeting this week, elected the following officers: Charles E. Case, president; William MacIntosh, vice-president, and Herbert Ellis, treasurer. J. Ross Moore was elected secretary. More than 75 companies were represented at the meeting. The Eastern Automobile Underwriters Conference elected the following officers: R. M. Barbour, president; C. R. Pritcher, vice-president and C. R. Lamont, secretary.

Michigan Sales Total 131,617

DETROIT, Dec. 3—The total number of new passenger cars titled in Michigan in October, totaled 8061 units. This compares with 13,235 in October, 1926. Total registration of new passenger cars in Michigan for the first 10 months of the year total 131,617 units compared with 179,912 cars for the same period, last year. The bulk of this decrease can be traced to Ford sales which total 14,886 for the 10 months compared with 59,652 for the same period, last year. New passenger car sales in Wayne county in November aggregated 1541 units. This brings sales for the first 11 months to 50,300 units compared with 74,795 units during the 1926 period.

Meetings and Events Scheduled for Week of New York Automobile Show

SATURDAY, JAN. 7

Hupp Motor Car Corp., Luncheon and Meeting, every day, Commodore Hotel.
Studebaker Corp. of America, Dinner, Hotel Plaza..... 7.00 p. m.

MONDAY, JAN. 9

National Automobile Dealers Ass'n, Eastern District Convention, Commodore Hotel .....10.00 a. m.
Oakland Motor Car Co., Meeting, Roosevelt Hotel..... 1.00 p. m.
Banquet, Roosevelt Hotel. 6.30 p. m.
Rubber Association of America, Inc., Meeting and Luncheon, Commodore Hotel .....10.00 a. m.
Dinner, Commodore Hotel. 7.00 p. m.
John N. Willys' Luncheon to Trade and Newspapermen, Biltmore Hotel .....12.30 p. m.

TUESDAY, JAN. 10

National Automobile Chamber of Commerce, Banquet, Commodore Hotel ..... 6.30 p. m.

WEDNESDAY, JAN. 11

Auburn Automobile Co., Luncheon, Commodore Hotel ..... 1.30 p. m.
Cadillac Motor Car Co., Dinner, Hotel Astor ..... 7.00 p. m.
Chevrolet Motor Co., Business Meeting, Mecca Temple ..... 1.30 p. m.
Banquet, Commodore Hotel ..... 6.30 p. m.
H. H. Franklin Mfg. Co., President's Luncheon, Commodore Hotel ..... 1.00 p. m.
Gardner Motor Co., Luncheon and Meeting, Hotel Belmont ..... 1.00 p. m.
Motor & Accessory Manufacturers Ass'n, Annual Meeting, Hotel Astor..... 2.30 p. m.
Banquet, Hotel Astor..... 7.00 p. m.
Paige-Detroit Motor Car Co., Luncheon, Roosevelt Hotel. Noon
Peerless Motor Car Corp., Dinner, Commodore Hotel. 6.30 p. m.

THURSDAY, JAN. 12

Society of Automotive Engineers, Dinner, Hotel Astor ..... 6.30 p. m.

Larger Personnel Urged for Commerce Department

WASHINGTON, Dec. 9—The need for a larger personnel in the U. S. Bureau of Foreign and Domestic Commerce, of the Department of Commerce, was stressed this week before the House committee on commerce activities by H. H. Rice, director of the National Automobile Chamber of Commerce. Speaking for the automobile industry, Mr. Rice pointed out that the value of automotive exports in 1926 was $337,000,000 and amounted to 11 per cent of the total production of the automobile industry. For the current year, he predicted $406,000,000 exports.

He urged the committee to supply the Department of Commerce with the necessary funds which would enable them to have a larger staff of trade commissioners throughout the world in order that American industry may secure a larger share of the world trade.

Tool Companies Merge

NEW COMERSTOWN, OHIO, Dec. 5—The plants of the Vixen Tool Co. and the Rex File Co. have been merged under the name of the Heller Bros. Co. of Ohio. It is proposed to erect and equip a new factory building with about 40,000 sq. ft. of floor space.

Moskovics Cites Relation of Advertising to Sales

CHICAGO, Dec. 3—"Business men have been told that the mere expenditure of certain large sums of money for advertising is the cure-all for their business, and in consequence much of the good, old-fashioned selling has been permitted to drop into the discard," said F. E. Moskovics, president of the Stutz Motor Car Co. of America, Inc., in an address this week before the Advertising Council of Chicago, a division of the Chicago Association of Commerce.

Mr. Moskovics expressed the opinion that advertising is a "collateral fact" in the economic life of the country, but that it is not a substitute for good salesmanship. He said the present great need in advertising is a more intelligent understanding between the advertising fraternity and advertiser.

"One of the greatest things for the industrial welfare of America, for the advertiser and the advertising profession would be an endowed course in advertising—and I do not mean psychology, but real advertising—in a great university. Make it a post-graduate course, if you please, and give a degree of doctor of advertising upon its completion. It would be well for a lot of advertisers to take such a course, and I would be glad to be one of them."

Dole Completes Unit

CHICAGO, Dec. 5—Dole Valve Co. has just completed an addition to its factory here which will double its capacity and affords approximately 80,000 sq. ft. of manufacturing space.

Milwaukee Scraps 160 Cars a Month

Dealers' Have Now Salvaged 800 Cars Since July—Parts Demand Grows

MILWAUKEE, Dec. 5—Eight hundred used cars have been scrapped by the Auto Trade Salvage Co., the dealer owned car scrapping company here, in the five months of its operation since July 1. The average per month since July has been 160 cars, the first month being the highest with 200 cars taken in and permanently removed as further trading possibilities. The first year is expected to result in 3000 cars being scrapped.

Used parts salvaged from the cars are being sold in fair quantities, so much so that a fair margin of profit is being realized. Under the organization terms, used parts are sold at a heavy discount to dealers. A considerable volume too is being sold directly from the scrapping yard to car owners. Since July 1 there have been 25,000 used parts sales. This business is reported increasing every month and sale is being extended through the state.

The company has been given much favorable publicity because of its work in taking many decrepit cars from the road and thus removing possible sources of danger and traffic difficulty. There also has resulted a better understanding as to the actual value of used cars to dealers and a fairer attitude on appraisals is reported.

E. H. Wilson Body Sold, Becomes Moline Stamping

MOLINE, Dec. 3—The reorganization committee headed by H. A. Priester was successful in its bid of $705,000 for the real estate, fixtures and current assets of the E. H. Wilson Mfg. Co., body manufacturer, at the receiver's sale in Springfield this week and plans will go ahead rapidly to reopen the factory, which will be known as the Moline Stamping & Mfg. Co. with a capitalization of $475,000 in bonds, about $425,000 in preferred stock and 30,000 shares of common stock.

Ralph H. Norris, who has been general manager of the plant and Al Smith, factory manager, will continue in those positions and the remainder of the organization will be built up as rapidly as possible.

Olds Units Nearly Ready

LANSING, Dec. 5—Work on the $3,500,000 extensions to the Olds Motor Works are nearing completion and the return of employees to the plants will be gradual and will resume the latter part of December. By the first week in January the new plant will be on its new schedule, factory executives say.

Europe to Extend Triptyque to U. S.

PARIS, Nov. 19, *(by mail)* —Extension of the European triptyque system to the United States is expected to be put into operation at an early date by the signing of a decree now before President Poincare. Under this measure, which has received very favorable approval in official French circles, the American Automobile Association will be empowered to issue triptyques to American cars coming to Europe for touring purposes, this document allowing the owners of the cars to travel through practically all European countries with no other formality than the signing of their papers at the frontier stations.

Yellow Truck to Move in New Plant Dec. 15

PONTIAC, Dec. 3—According to Louis Ruthenberg, assistant general manager of the Yellow Truck & Coach Mfg. Co., the new $8,500,000 plant being erected here will open its doors Dec. 15 instead of Jan. 3 as originally planned. The first equipment will be installed starting Dec. 15 and manufacturing will start in each division as the equipment is completed.

The first divisions to be moved to the new plant will be the Pontiac divisions. Moving of the Pontiac divisions will not be completed until late January or early February. Moving of the Chicago division to Pontiac will then start on Feb. 15, according to H. J. Warner, manager of the Pontiac division. Offices of the company will also be centralized in the new administration building which will be ready for occupancy the last of January.

Chevrolet Resumes Dec. 12

FLINT, Dec. 3—According to Charles E. Wetherald, factory manager, men are being put back to work in various departments of the Chevrolet Motor Co. plants here, and the assembly line will start operating Dec. 12 following completion of inventory. By the time the assembly line is opened the engine and sheet metal plants will be under full production. Capacity production is expected on the assembly line almost immediately after it is started.

Tyree Report Approved

BLOOMINGTON, ILL., Dec. 3—Creditors have approved the report of the stockholders' committee regarding financing of the Tyree Auto Radiator Co. which is expected to open way for dismissal of the bankruptcy suit filed last April and permit unhampered operations of the factory.

Dickinson Reviews Research Results

Bureau of Standards Chief Describes Accomplishments to Metropolitan Section

NEW YORK, Dec. 3—Dr. H. C. Dickinson, chief of the division of heat and power, United States Bureau of Standards, emphasized the human element in research in an address before the Metropolitan Section of the Society of Automotive Engineers held at the Hotel Woodstock this week. About 150 members and friends were present.

Dr. Dickinson reviewed from a personal angle the work that has been done in the bureau for the advancement of the automotive industry. Beginning with the classification of research under the three heads, pure scientific research, industrial research and "trouble shooting," he showed how much of the pure scientific research, which has been conducted at the bureau in coordination with industrial research, has proved of financial advantage to the companies in the industry.

He gave a description of some of the work now being performed by H. H. Allen in a study to determine the most efficient types of headlights. He described in some detail an ingenious method whereby headlights are mounted on the rear of one test car, which is followed by a second test car, to study the effect of glare upon the driver.

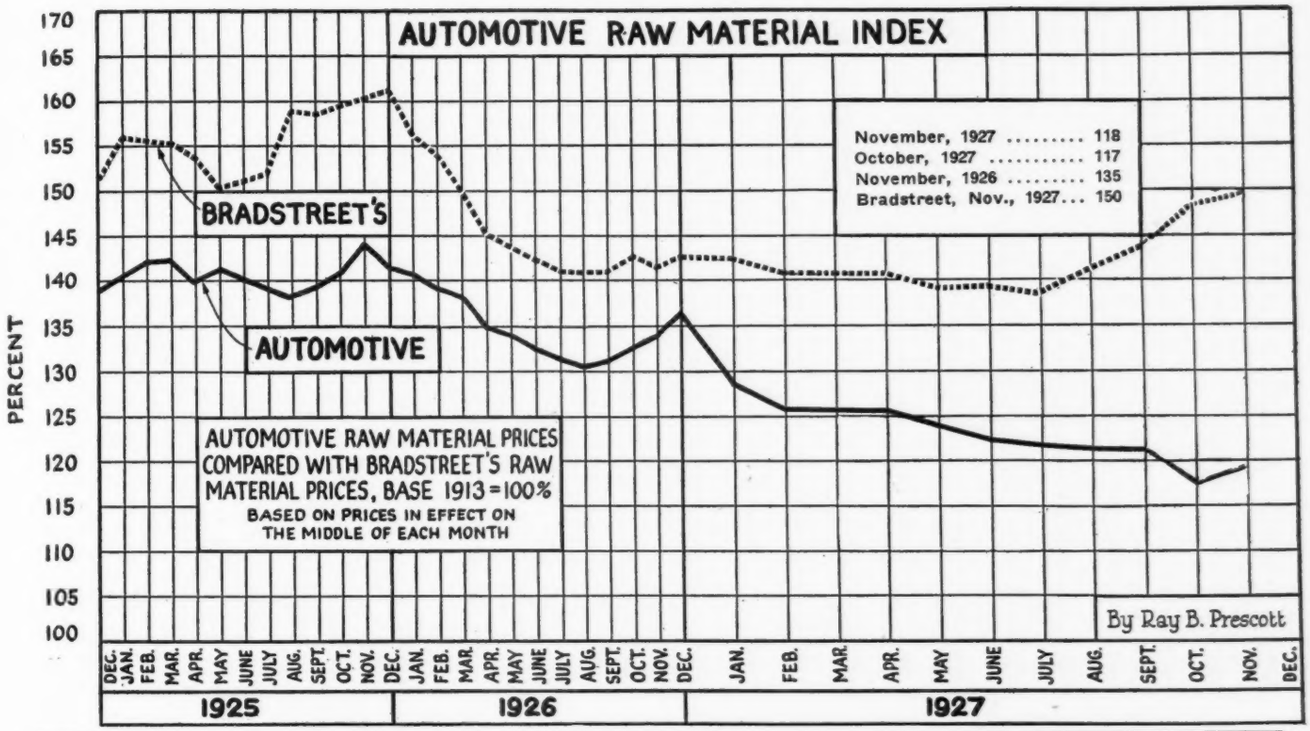
In the discussion which followed Dr. Dickinson's address, David Beecroft touched upon another angle of the human element in research by pointing out the need of research along certain lines to mimimize traffic accidents. R. E. Carlson of the Edison Lamp Works, pointed to the fact that pure science research often results in findings which are of great economic value and pointed to the numerous developments in the radio and lighting field which have come about as the result of the so-called Edison effect. Neil McCoull of the Texas Co. contributed to the discussion in the laudation of the value of bureau science research.

New Committees Named

Sidney R. Dresser of Whitney, Blake Co., was appointed section representative to the committee on nominations for the national association, and George A. Round of the Vacuum Oil Co., alternate. Edward F. Lowe of K. P. Products, chairman of the section was appointed section representative to the national sections committee.

The following committee was appointed to make nominations for new officers for the section: Alfred M. Welch of Reo Motor Car Co., William E. Kemp, distributor for Byrne-Kingston & Co., George A. Round, David Beecroft and Grosvenor Hotchkiss of the Western Union Telegraph Co.

Raw Material Index Gains One Point



New York Mayors Vote State Aviation Control

ALBANY, N. Y., Dec. 3—The New York State Aviation Conference, designed to introduce legislation providing for state control and regulation of aviation, in harmony with and complementing Federal air laws and to make regulation for building of airports and to regulate aviation and pilots, was initiated here yesterday by the New York State Conference of Mayors.

The conference favored drafting of legislation which will definitely authorize counties, county park commissions, cities and villages to appropriate funds and use bonds to construct and equip airports, landing fields or emergency fields, and to appropriate funds for the maintenance and operation thereof.

Assistant Secretary of War F. Trubee Davison, who addressed the opening session of the conference, urged resolutions which would result in driving "gypsy" aviators from the state.

Mexico Takes 69,842 Tires

WASHINGTON, Dec. 5—United States exports of automobile casings to Mexico the first nine months of this year totaled 69,842, valued at $794,586, according to figures compiled by the U. S. Department of Commerce. The average price per casing was $11.38 compared with $13.98 average the first nine months of last year. Automobile registration in Mexico on Jan. 1 was 50,476—an increase of 10 per cent over Jan. 1, 1926. The United States manufacturers of tires did a total of 80 per cent of the Mexican import business the first three quarters of this year.

Cadillac Now Issuing Magazine for Owners

DETROIT, Dec. 5—"The Crest" is the title of an attractive new magazine which is being introduced by Cadillac Motor Car Co. and which will be circulated by the company's distributors and dealers among Cadillac and LaSalle owners. The publication will appear monthly and the November issue marks the initial number. The magazine covers a wide range of subjects, including sports, touring, modes, art and literature, artistically presented and profusely illustrated in color.

The purpose of the magazine is to enable the Cadillac-LaSalle organization to maintain a somewhat intimate contact with owners through the medium of magazine articles and illustrations not necessarily relating to motor cars but of particular interest to the class for whom it is written.

England Has 590,000 Cars

WASHINGTON, Dec. 8—An automobile census of England, just completed by the English government and forwarded to the U. S. Department of Commerce, shows as of June 1 a total of 590,000 passenger cars and 225,223 trucks. The census of Scotland, also announced, is given as 55,507 motor cars and 22,022 trucks.

Franklin Sales Exceed Total for All of 1926

SYRACUSE, Dec. 5—The H. H. Franklin Mfg. Co. has just completed one of the most active 90-day periods in the history of the company. Production last month was 24 per cent ahead of the corresponding month last year; October showed a gain of 106 per cent over October, 1926, and September a 49 per cent gain over September, 1926. Total shipments for the first 11 months of the year have been greater than the shipments for the whole of 1926.

The Franklin plant is at present working temporarily on a half-day basis, the factory closing at noon. This is caused by delayed shipment of certain body styles necessary for orders on hand and a change in certain machinery processes. With orders ahead to insure full time production for all of this month, officials hope to be back on the full day schedule soon. When regular production is resumed the plant will operate on a 40 cars per day basis.

Tunnel Rules Modified

NEW YORK, Dec. 5—Officials of the joint New York and New Jersey tunnel commissions have changed the toll on large buses passing through the new Holland tunnel to a flat rate of $1.50 for buses carrying more than 29 passengers and have removed the requirement of a special permit for such buses. Buses of smaller capacity will continue to pay the $1 flat rate.

A.A.A. Recommends Regulation of Buses

WASHINGTON, Dec. 6—The regulation of motor buses used interstate was recommended here this week by the bus division of the American Automobile Association representing 2100 affiliated operators, operating approximately 25,000 buses. Regulation of the buses, it was declared, should be vested primarily in state commissions, but with the right of appeal to the Interstate Commerce Commission. The association will present its argument for primary state control and secondary Federal control at a hearing before the Interstate Commerce Commission Jan. 16.

Senator Watson, of Indiana, chairman of the Senate committee on interstate commerce, and Representative Denison, of Illinois, a member of the House committee on interstate and foreign commerce, will sponsor measures early in the present session for the regulation of interstate bus traffic.

Chrysler Adds Town Sedan

DETROIT, Dec. 5—Chrysler Corp. is now building a town sedan in its Model 72 line, priced at $1,695. Upholstery and appointments are similar to other closed models in this line. Flush type side cowl ventilators are used. Wells for spare tires on both front fenders and a folding trunk rack are standard equipment.

Gets Morehead Medal

NEW YORK, Dec. 5—Underwriters' Laboratories, Inc., has been awarded the Morehead Gold Medal of the International Acetylene Association for exceptionally meritorious service in the production and utilization of calcium carbide and acetylene.

Anglo Machine Moves

NEW YORK, Dec. 5—Anglo Machine Mfg. Co. has moved into larger quarters in the President Monroe Building, 270 Lafayette St.

Coming Feature Issues of Chilton Class Journal Publications

Jan. 1—National Shows Number—Automobile Trade Journal.

Jan. 5—National Shows Issue—Motor Age.

Feb. 18—Statistical Issue—Automotive Industries

Chicago Reserve Bank Shows Used Cars Lower

CHICAGO, Dec. 5—Retail sales of new cars in the Chicago Federal Reserve district in October were 4.9 per cent below those in September and 30.4 per cent below October last year. Stocks of new cars on hand showed a 10.3 per cent decrease under September and 3.3 decrease under October, 1926.

Used car sales in October showed an 8.2 per cent increase over September and a 3.4 per cent gain over October last year. Used car stocks, however, were 5.3 per cent larger than in September but were 7.3 per cent lower than in October, 1926.

Cleveland Sales Lower

CLEVELAND, Dec. 5—Sales of new and used cars here were below the marks set in October this year and November last, reports Herbert Buckman, secretary of the Cleveland Automobile Manufacturers & Dealers Association. There were 6326 used cars sold in November, 8078 in October, and 6990 in November, 1926. New car sales in November were 1228, against 1671 in October and 1963 in November, last year.

Will Have 1500 Kilowatt Load

PHILADELPHIA, Dec. 5—Electric furnace equipment which the George J. Hagan Co., Pittsburgh, has sold F. I. A. T., will have a connected load of 1500 kilowatts, instead of 150 kilowatts as previously stated.

Delage and Talbot Quit Racing Field

PARIS, Nov. 19 (*by mail*)—Announcement is made by the Delage company that the 91½ in. racing cars which won the world's championship this year and captured first place in every speed contest in which they were entered, will shortly be put up for sale. It is understood that Delage will withdraw from all racing activity next year and that the engineers in the racing department will devote their attention to the production of stock cars.

The French Talbot company also officially has withdrawn from racing and is endeavoring to dispose of its 91½ in. straight-eight racing jobs. These cars, designed by the Italian engineer Bertarione, have been run only once this year. This event indicated that changes were necessary in the chassis, but in view of the expense and the small financial return from racing, the company decided to drop out of the game.

Major European racing events next year will be for cars of any type coming within the minimum weight limit of 1212 lb. and maximum of 1653 lb.

Financial Notes

Stromberg Motor Devices Co. reports net profit for the quarter ended Sept. 30 as of $38,687 after expenses and Federal taxes, equivalent to 48 cents a share earned on 80,000 shares of no par stock. This compares with $62,579, or 78 cents a share, in the preceding quarter and $164,767, or $2.05 a share, in the third quarter of 1926. A quarterly dividend of 50 cents was declared payable Jan. 2 to stockholders of record Dec. 12.

Mack Trucks, Inc., will call for redemption Dec. 31 all of the first and second preferred stocks at total redemption price, including accrued dividends, of approximately $18,000,000. Both preferred stocks will be redeemed from company's cash and there will be no new financing. The company has net current assets of about $52,000,000. The regular quarterly dividend of $1.50 on common payable Dec. 31.

Calendar of Coming Events

SHOWS

All Western Road Show, Los Angeles, March 7-11
American Road Builders Association, Public Auditorium, Cleveland..Jan. 9-13
*Boston, Mechanics Bldg.....March 10-17
*Chicago, National Automobile Chamber of Commerce, Coliseum, Jan. 28-Feb. 4
International Aircraft Show, Berlin, March 23-April 11
*New York, National Automobile Chamber of Commerce, Grand Central Palace .....Jan. 7-14
Rio de Janerio.....May 3-13
Salon, Automobile Salon, Inc., Hotel Drake, Chicago .....Jan. 28-Feb. 4
Salon, Automobile Salon, Inc., Hotel Biltmore, Los Angeles.....Feb. 11-18
Salon, Automobile Salon, Inc., Palace Hotel, San Francisco..Feb. 25-March 3
United States Good Roads Show, Des Moines .....May 28-June 1

*Will have special shop equipment exhibit.

CONVENTIONS

American Road Builders' Assn., Hotel Hollenden, Cleveland .....Jan. 9-13
American Road Builders' Association, Banquet, Hollenden Hotel, Cleveland .....Jan. 11
Automotive Equipment Association, Grand Hotel, Mackinac Island, June 10-16
National Automobile Dealers Ass'n, Annual Meeting, Palmer House, Chicago. .....Jan. 31-Feb. 2.
National Battery Mfrs. Assn., Chicago, Feb. 15-16
National Foreign Trade Council, Houston, Texas .....April 25-27
United States Good Roads Association and Bankhead National Highway Association, Des Moines.May 28-June 1

S. A. E.
National

Detroit, Jan. 24-27—Annual Meeting.

Sectional

Chicago, Dec. 13—New Advances in the Study of Engineering Materials by Means of X-Rays—Prof. G. L. Clark.
Cleveland, Dec. 19—Research—Dr. H. C. Dickinson.
Indiana, Dec. 15—The Automobile of the Future—T. A. Boyd.
Metropolitan, Dec. 15—Engines—W. S. James.
Pennsylvania, Dec. 13—Effect of Vehicle Design Changes on Service Station Equipment.